

INSTRUCTIONS

for assembling and operating



LIONEL TRAIN

IMPORTANT

1950 Lionel train outfits are designed for use with "Multi-Control" transformers which are equipped with built-in controls for operating the locomotive reversing mechanism and for blowing the train whistle. For this reason 1950 outfits do not include a separate No. 167 Whistle Controller previously furnished with all whistling outfits.

All "027" outfits include a No. 1033 "Multi-Control" Transformer which is suitable for operating the outfit plus a few accessories.

"O" outfits do not include a transformer; a separate transformer to fit the requirements of your model railroad must be purchased from your dealer.



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INTRODUCTION

FEW hobbies in the world offer as much fun as model railroading. Here, in miniature, are all the color and excitement of real railroading, with speedy passenger trains and fast freights making runs through cities and towns and open countryside.

If you are a beginner in this fascinating pastime and this is your first Lionel outfit you will need a few simple directions to set up your layout and to run your train. The first part of this booklet, "How to Assemble and Operate Your First Lionel Outfit", contains all the directions you need in order to enjoy any simple standard outfit.

If you are like most model railroaders we know you will soon add to your original outfit. Perhaps a pair of switches and some extra track. Maybe a semaphore or a gateman to guard your grade crossing. Then you will need to know something about voltage requirements of various Lionel railroad accessories, about the capacity and limitations of your transformer and the best methods of wiring up your layout and accessories. All this information, in a condensed form, is available in the second part of this booklet "How to Operate Lionel Accessory Railroad Equipment".

The third part of the booklet will help start you off on a project which is the ambition of all model railroaders—"How to Build a Model Railroad". Here is a discussion on how to select a space for a permanent layout; how to design track arrangement to fit the available space; how to construct the framework; how to work out actual railroad problems and how to landscape and decorate your railroad so that it becomes an actual operating railroad in miniature.

Like all fine mechanical equipment, your Lionel outfit deserves good care. If properly cared for, your Lionel equipment will give many years of service and enjoyment. Information that should enable you to find and eliminate trouble spots, to do simple maintenance and to keep your equipment in tip-top condition is contained in the last part of the booklet, "How to Take Care of Lionel Trains". For more serious service and repair problems there is an appendix listing the names and addresses of all Lionel Authorized Service Stations.

PART ONE

HOW TO ASSEMBLE AND OPERATE YOUR FIRST LIONEL OUTFIT

HOW TO ASSEMBLE YOUR LAYOUT

ASSEMBLING THE TRACK

The track supplied with most outfits will make a simple oval layout as shown in Figure 7. The curved sections make up ends of the oval; the straight sections make up the sides. The special Remote Control section used for uncoupling and unloading cars goes on the side of the oval, preferably between two regular straight sections.

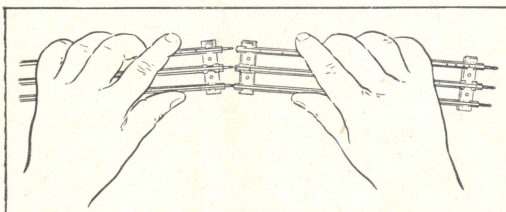


Figure 1—How to Join Track

Join the track by inserting the pins of one track section as far as they will go into the rail openings of the next section. The pins should fit tightly. To hold track sections securely together use connecting clips supplied with the track. "O" type track clips are pushed over the track ties. See Figure 2. Clips for "027" track are hooked on the tie of one section then snapped over the end tie of the next section. See Figure 3.

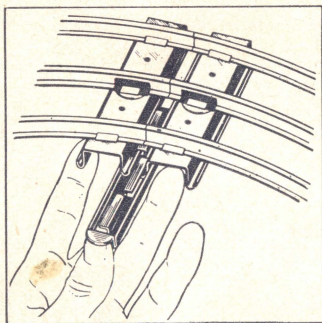


Figure 2—"O" Track Clip

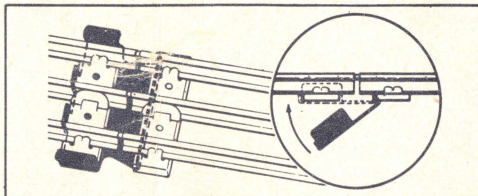


Figure 3—"027" Track Clip

ATTACHING "LOCKON" TO TRACK

After track is assembled, attach the Lockon to a straight track section. This special clip is used for connecting the rails to the transformer. Fit the flange of one of the outside rails into the wide v-shaped notch of the Lockon. Then press the Lockon upward until it snaps onto the center rail. See Figure 4.

Each spring clip on the Lockon is connected to one of the transformer terminals by a piece of copper wire furnished with the outfit. The wires are coiled for convenience only and may be straightened when necessary.

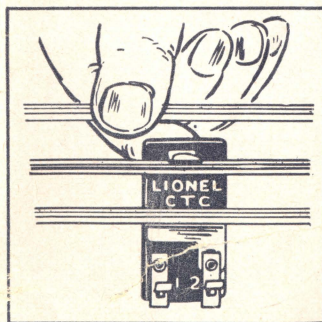


Figure 4—Snap Lockon on Track

"Wipe Your Track Regularly"

Page

CONNECTING THE WIRES

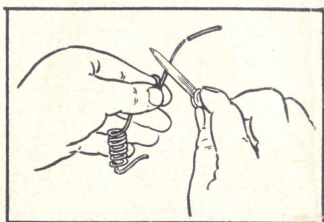


Figure 5—Removing Insulation

The other ends of the two wires connected to the Lockon go to a pair of transformer binding posts which give variable voltage. On No. 1033 transformer, which is furnished with all "027" train outfits, these posts are either U-A or U-B. On simple layouts, the order does not matter. Wrap the bare wire around the screw portion of the post and screw down the thumb nut tightly. Make sure the wire doesn't slip out as you tighten nut.

First try the U-B posts. Then, if the train does not go fast enough, use U-A posts.

Remove insulating covering from the ends of the wires before making connections. Wrap the wire around your index finger. Rest the wire end on a solid surface. Then place a knife edge firmly on the wire and pull wire toward you. This will remove insulation without cutting the copper wire.

Push down the springy upper half of the Lockon terminal clip until the metal loop in the lower part projects through the top. Insert the bare wire end through the loop and release the upper half. Spring tension will hold the wire tight.

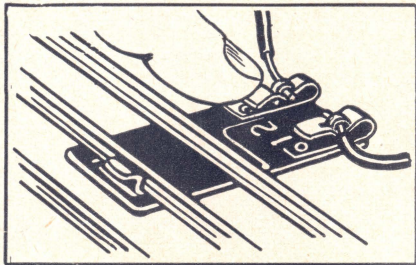


Figure 6—Lockon Connections

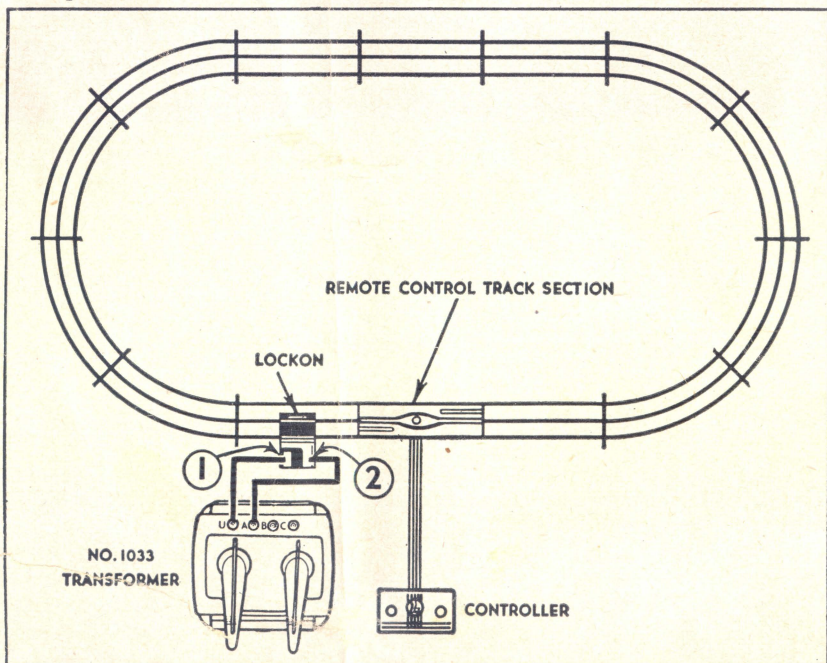


Figure 7—How an Assembled Layout Should Look

HOW TO SET UP YOUR TRAIN

CHECK AND LUBRICATE YOUR EQUIPMENT

By the time you read this you have probably already unpacked and examined your Lionel outfit. It's a good idea to save the boxes and the corrugated board packing. They will come in handy for storing or transporting your equipment. Check the equipment to see that nothing is missing or broken. Spin all the car wheels to see that they turn freely and put a small dab of Lionel lubricant on the ends of the axles.

If your locomotive is one of those where the motor can be reached from the side, as illustrated in Figure 8, you should lubricate the ends of the armature shaft before you try to run it, or it may bind.

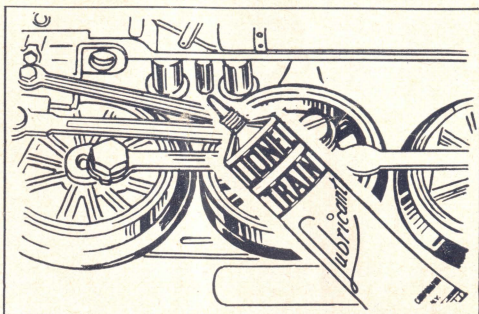


Figure 8—Lubricating Locomotive Motor

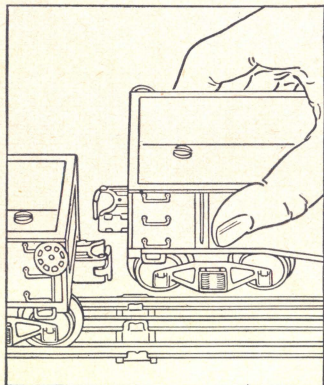


Figure 9—How to Couple Cars

HOW TO SET UP THE TRAIN

Place the locomotive and tender on the track and join them by means of the locomotive drawbar. If you have a diesel outfit the power car should be first. Then couple on the rest of the cars by raising the end of the car and engaging the coupler by hand. (See Figure 9) If the couplers are open close them by pushing in the coupler knuckle until it snaps shut. The heaviest cars should generally be placed at the head of the train.

Make sure that all the wheels of the locomotive and the cars are properly set on the track. If they are not, they may cause a "short circuit" on the track and the train will not operate.

CHECK YOUR POWER SUPPLY

There are several things you should know about your electrical power supply before you plug in your transformer or attempt to operate your train.

1. Never connect your train layout directly to an electric outlet. Always use a transformer.

A transformer changes the high voltage electric power used in your house (usually 115 volts) to the low voltage used for operating toy trains (from 8 to 18 volts). The transformer cord is plugged into any convenient wall outlet. Low voltage is then obtained from the binding posts on top or in back of your transformer.

2. All household power lines are not alike. Make sure that the voltage and frequency (cycles) of your electric power supply correspond to the rating of your transformer. If in doubt ask your electric company.
3. If you happen to have direct current (DC) a transformer cannot be used for it will burn out immediately.

For a full discussion of your power supply see page 35.

HOW TO OPERATE THE TRAIN

CHANGING THE TRAIN SPEED

The speed of the train is varied by moving the voltage control on the transformer panel. The higher the voltage the greater the speed. Most Lionel transformers provide at least two different voltage ranges. The lower range is used for light trains; the higher range for heavier trains. Always try the lowest range first; use the higher range only if the train does not go fast enough. When running your train keep one hand on the voltage control. In this way you will be able to slow the train down on curves, speed it up along the straight-away or bring it down to a gradual stop at the uncoupling track section.

REVERSING THE LOCOMOTIVE

Lionel locomotives can be stopped and reversed by *remote control*. The reversing mechanism is known as the "E-Unit." It is mounted within the locomotive and is operated by momentary interruptions of current to the track. This operation can be performed at any distance from the locomotive either by operating the "Direction" control on the transformer, or by turning the voltage control to "OFF" position. (The accidental "shorting" of the track, or disconnecting of one of the current-carrying wires will also cause the E-Unit to operate.)

The E-Unit has three positions which operate in rotation: Forward, Stop, Reverse, Stop, etc. When the locomotive is running move the "Direction" control *once* to stop it and *twice* to reverse it. The Stop or Neutral position enables the locomotive to stand still even though power for accessories, lights, etc. is still supplied to the track.

NOTE: Lionel Locomotive No. 6110 is an exception to this general rule since its reversing mechanism does not have a neutral position, but moves from "Forward" directly to "Reverse".

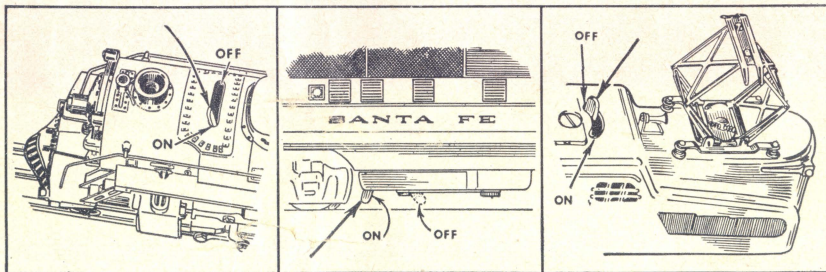


Figure 10—Location of E-Unit on Various Locomotives

HOW TO DISCONNECT REVERSING MECHANISM

The E-Unit can be disconnected by pushing the E-Unit lever to the OFF position. Then the locomotive will not reverse automatically but will always run in the same direction. To disconnect the E-Unit start the locomotive going in the desired direction; stop it with your hand while power is on; then move the E-Unit to OFF. Figure 10 shows the location of the E-Unit lever in three types of Lionel locomotives.

For normal operation the E-Unit lever should be left ON in order to take advantage of the remote control of locomotive direction. It should be moved to OFF when operating the train together with an automatic stop station, operating bridge or insulated block, as described elsewhere in this booklet.

NOTE: If the E-Unit is disconnected while it is in Stop position, the locomotive will not start at all. Also, because it is operated partly by gravity the E-Unit will not work if the locomotive is placed on its side or held upside down.

BLOWING THE WHISTLE

Following actual railroading practice most Lionel steam-type trains are equipped with a two-tone whistle, while the electric and diesel types contain a horn. The whistle is mounted in the locomotive tender, while the horn is located in the electric locomotive itself and in the power car of the twin diesel. Both the whistle and the horn can be sounded anywhere on the track by operating the whistle controller.

In most modern Lionel transformers the whistle controller is built into the transformer and is operated by a button or a lever on the transformer panel. If your transformer does not have a built-in whistle controller, an external No. 167 Whistle Controller must be used. See page 14.

Note: Lionel remote control horn and whistle can be used only with alternating current having a frequency of more than 40 cycles. When line frequency is less than 40 cycles (Some parts of Canada and some communities in the United States use 25-cycle power lines) the whistle and the horn must be disconnected. Otherwise they will sound continuously. Remove dry cell from locomotives using horn. In whistle tenders disconnect wire from contact rollers.

FLASHLIGHT CELLS FOR HORNS

The power for operating the whistle is supplied by the track itself, but the horns on the diesel and the electric locomotive use a flashlight cell which is supplied with the outfit and which must be inserted into the locomotive as shown in Figure 11. When the cell is worn out it can be replaced by any standard size D flashlight cell.

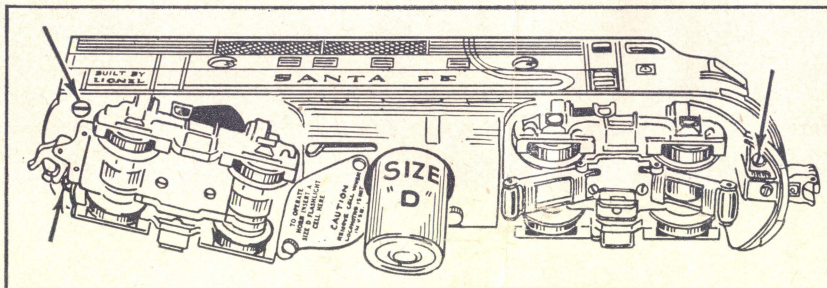


Figure 11—How a Flashlight Cell Fits Into a Diesel Locomotive. Arrows Point to Screws Which Hold the Locomotive Body

"MAGNE-TRACTION" LOCOMOTIVES

All new Lionel locomotives are equipped with "Magne-Traction" which means that the locomotive driving wheels are magnetized to enable the locomotive to pull heavy loads without slipping on the track. Be careful not to let pins, paper clips, carpet tacks or other loose small iron objects to come in contact with the locomotive or they will be attracted to the wheels, gears or axles and may jam up the mechanism of the locomotive. Small particles of iron, such as iron filings may be removed from magnetized parts with the point of a sharp steel needle. To obtain the benefit of "Magne-Traction" use only Lionel track. "Magne-Traction" is not effective on aluminum, brass or stainless steel rails.

Although "Magne-Traction" locomotives can pull more than twice the load of ordinary locomotives they should not be overloaded beyond that point, or their motors will tend to overheat.

Also, because "Magne-Traction" is effective only on steel rails, very heavily loaded "Magne-Traction" locomotives will tend to skid when going over bakelite portions of remote control switches, and therefore should not be stopped on switches.

"Wipe Your Track Regularly"

Page 7

SMOKE LOCOMOTIVES

Most Lionel steam-type locomotives are equipped to produce odorless, realistic "smoke." Drop a smoke pellet into the smoke stack and turn on the track power. In a few seconds the heater within the smoke generator will melt the pellet and smoke will rise out of the stack. The locomotive will puff only when the wheels are turning.

Each pellet has enough smoke material to last a long time. For best results use up one pellet before dropping in another. Too many pellets will actually reduce the amount of smoke.

After the locomotive has been used for a while it may produce less smoke than it did at first. This may be caused by smoke material clogging up the air opening inside the generator. Increase the track power slightly and let the locomotive stand in neutral for a few minutes. This treatment clears the smoke generator and the locomotive will puff as well as ever.

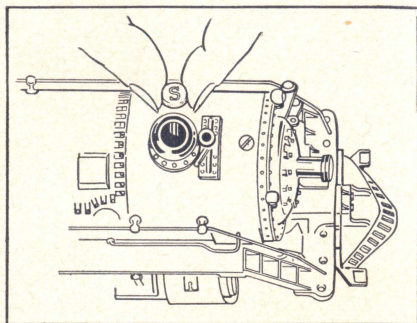


Figure 12—How to Load Smoke Pellets Into Locomotives



Figure 13
SP Smoke Pellets

All modern Lionel locomotives must use *SP Smoke Pellets* which come in glass bottles, as shown in Figure 13. *Don't use any other material* or you may destroy the smoke generator.

After a few hours of use you may find that a white powder has collected in the smoke stack. This is all smoke material. Push it back into the smoke stack with the wood tamper provided. A whitish deposit on the locomotive body can be cleaned off with soft cloth moistened with a little Lionel Lubricant.

SP Smoke Pellets have been rigorously tested by recognized testing laboratories. They are absolutely harmless even if accidentally swallowed.

SHORT CIRCUITS

Most troubles in running an electric train are caused by accidental short circuits. A short circuit is a direct connection between two transformer posts. It is caused most often by a derailed wheel touching the center rail and the outside rail. A short circuit causes an excessive current to be drawn from the transformer. When a short circuit occurs the train stops, the lights dim or go out altogether; the transformer overheats and, if unprotected, will burn out.

To protect the transformer from the danger of burn-outs most modern Lionel transformers are equipped with built-in circuit breakers. If too great a current is drawn from the transformer, the circuit breaker opens and cuts off all power from the track. In a few seconds the circuit breaker resets automatically but will reopen almost immediately if the short circuit still exists. Lionel transformers RW, KW and ZW are also equipped with red warning lights which go on whenever a circuit breaker opens.

REMOTE CONTROL TRACK SETS

Lionel Remote Control Track Sets consist of a two-button controller wired to a special track section which has five rails and a centrally-located built-in electromagnet. The special sections are inserted into the layout as any ordinary track and are used to uncouple cars and to operate automatic unloading cars. One Remote Control Set is furnished with every Lionel outfit. Additional sets can be purchased and installed to permit uncoupling and operation of cars in as many places in the layout as you wish. It is best to have one regular straight section on either side of the special track.

The set used on "O" gauge track is known as UCS; a similar set matching "027" track is No. 6019.

COUPLING AND UNCOUPLING CARS

All standard Lionel cars and tenders, as well as switching, electric and diesel locomotives, are equipped with operating railroad-knuckle couplers. Although two types of couplers are used—the "electro-magnetic" for locomotives and for extra-long cars and the "magnetic" for most ordinary cars—both can be opened by the same Remote Control Track.

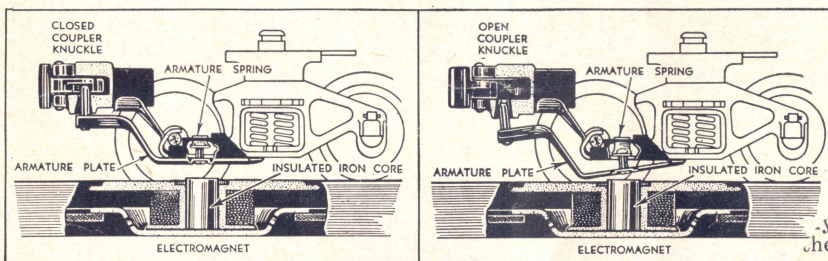


Figure 14—How "Magnetic" Couplers Operate

To open a closed "magnetic" coupler move the car so that the front wig on are over the central electro-magnet; then press the "Uncouple" bu The coupler can also be opened while the car is in motion by pressing "Uncouple" button at the proper moment.

To open a closed "electro-magnetic" coupler move the car so that the sliding shoe underneath the truck you want opened rides up on one of the control rails; then push the "Uncouple" button.

Both types of couplers are closed simply by pushing the open knuckle in until it latches, so to couple any two cars just push them together. Only one of the mating couplers has to be open for the cars to couple or uncouple.

Cars or locomotives equipped with "electro-magnetic" couplers are wired so that both couplers open when the "uncouple" button is pressed. "Magnetic" couplers can be opened separately.

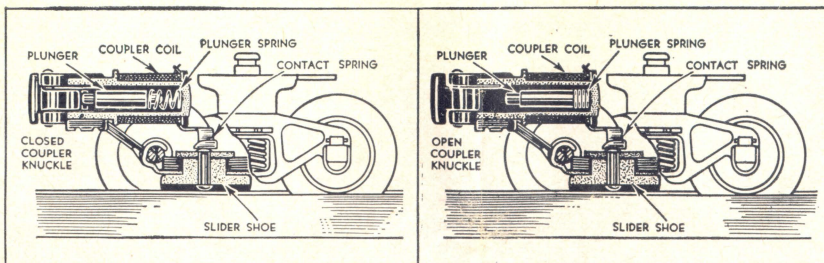


Figure 15—How "Electromagnetic" Couplers Operate

AUTOMATIC OPERATING CARS

Most Lionel train outfits contain at least one automatic car which is unloaded or otherwise operated by means of the same remote control track section used for uncoupling. The only exception to this is the Stock Car, which is described later.

CARS USING CONTACT SLIDERS

The mechanism of most *unloading* cars, such as the Milk Car and the Coal and Lumber Dump Cars, is powered by a built-in electrical coil, or *solenoid*, which gets its current from the track through the two sliding contact shoes on the bottom of the car. To operate such cars position them on the remote control section so that both contact shoes rest on the auxiliary control rails (See Figure 16). Then press "Unload" button on the controller.

If a dump car is heavily loaded, or if track voltage has been reduced to slow down the train, the car mechanism may operate sluggishly. In such cases increase the track voltage until the car operates satisfactorily.

The proper cargo is supplied with all dump cars. In Coal Dump cars use only Lionel Artificial Coal No. 206. Any other material, such as sand, etc. will tend to clog the operating mechanism of the car.

PLUNGER-OPERATED CARS

Operating cars such as the Animated Box Car and the Searchlight Car do not make an electrical connection to the auxiliary rails. Instead, their mechanism is operated when the iron plunger, or *armature*, projecting from the bottom of the car is attracted by the electro-magnet in the remote control section. To operate these cars position them on the remote control section so that the plunger is directly over the electro-magnet (See Figures 17 and 20); then press the "Uncouple" button of the controller. Cars can be operated either while they are standing or in motion, by pressing the controller button at the right moment. In the Animated Box Car, to get the car back into the car shut the open door by hand. In the Searchlight Car light will continue burning until the car is moved back to the remote control section and operated again.

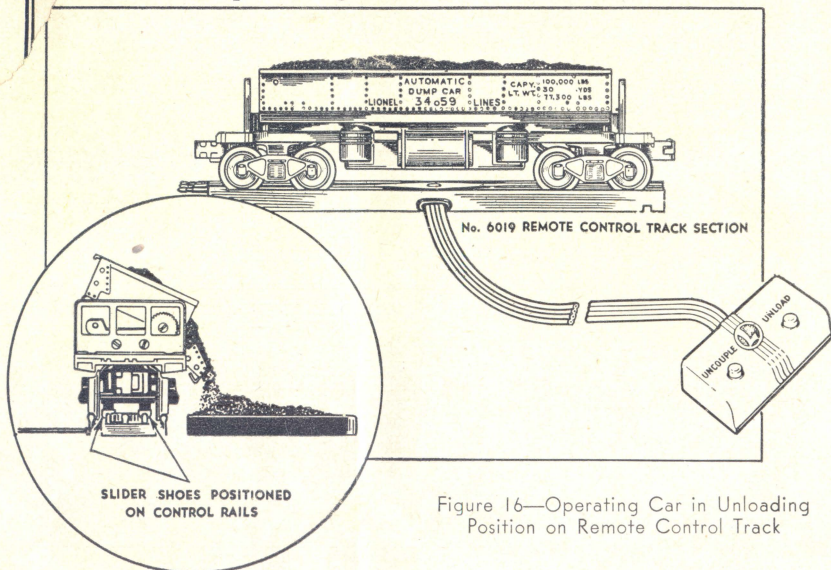


Figure 16—Operating Car in Unloading Position on Remote Control Track

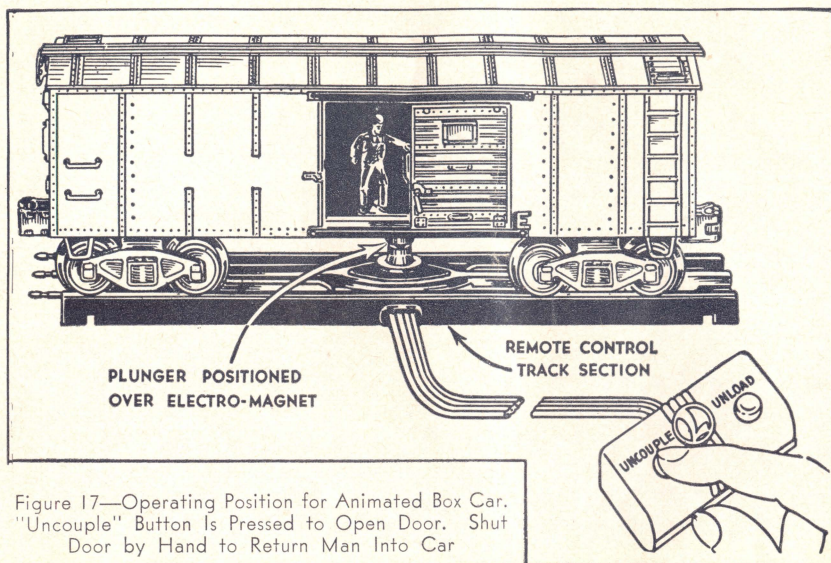


Figure 17—Operating Position for Animated Box Car. "Uncouple" Button Is Pressed to Open Door. Shut Door by Hand to Return Man Into Car

FIXED VOLTAGE FOR REMOTE CONTROL TRACK

The Remote Control Section is usually supplied with track voltage. It is possible, however, to connect it so that it will receive a fixed voltage directly from the transformer. To do that one of the four wires leading from the controller must be disconnected from the remote control section, and connected instead to a fixed voltage post on the transformer. On UCS sections this wire is No. 3; on 6019 section, it is No. 4. The transformer connections for such an installation are the same as for the Fixed Voltage Plug on 022 Switch, specified in Figure 29 on page 17.

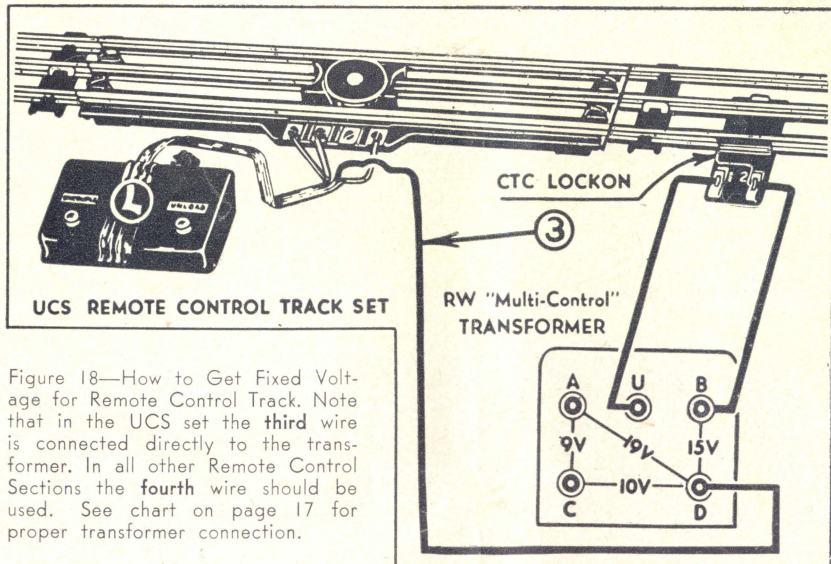


Figure 18—How to Get Fixed Voltage for Remote Control Track. Note that in the UCS set the **third** wire is connected directly to the transformer. In all other Remote Control Sections the **fourth** wire should be used. See chart on page 17 for proper transformer connection.

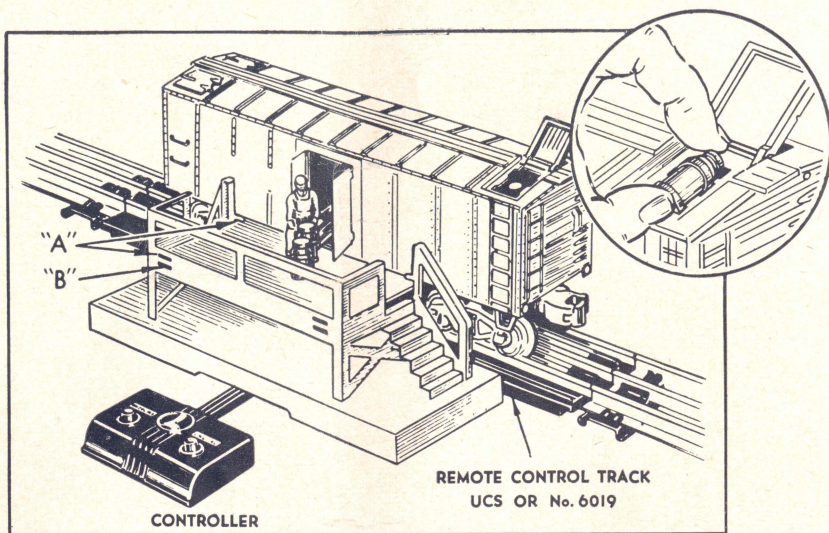


Figure 19—Installation for 3472 Automatic Milk Car

No. 3472 AUTOMATIC MILK CAR

Install the unloading platform provided with the Milk Car next to a remote control track section, as shown in Figure 19. When used with "O" track the floor of the platform should be inserted into the top "A" slots in the frame; when used with "027" track the floor should be fitted into the bottom slots "B". Simply pull out the floor platform and insert it into the proper slots and the corresponding notches on the side of the framework facing the track.

The miniature milk cans furnished with the car are loaded into the car

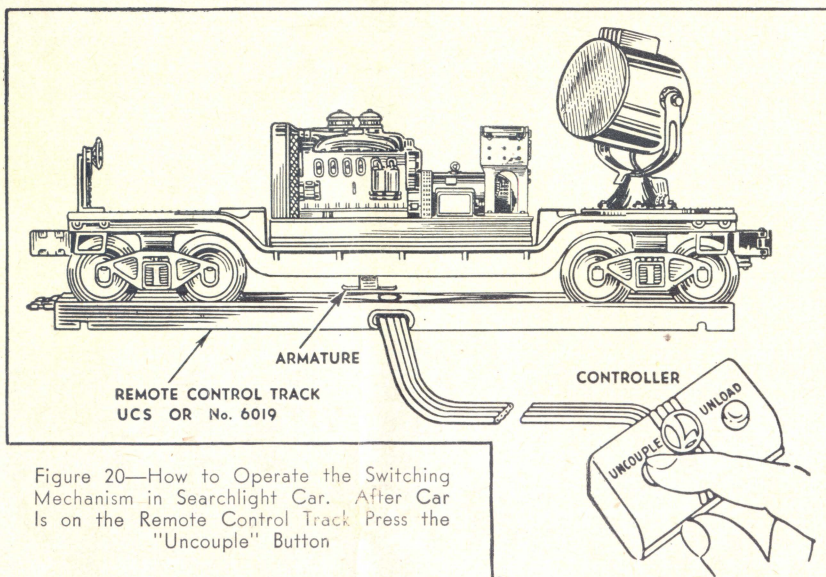


Figure 20—How to Operate the Switching Mechanism in Searchlight Car. After Car Is on the Remote Control Track Press the "Uncouple" Button

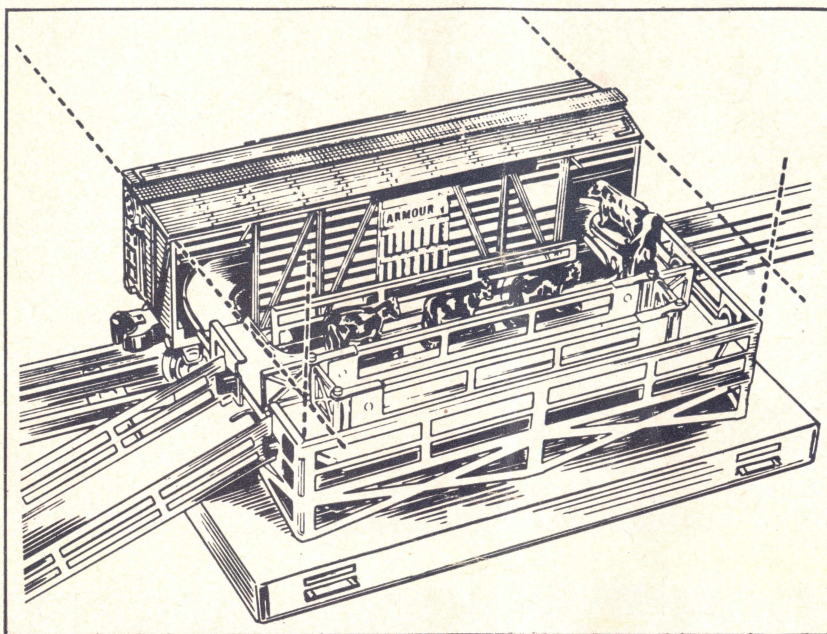


Figure 21—Operating Position of Stock Car. Note that Car Must Be Lined Up with Platform Accurately

by hand through the hatch in the roof. (See inset in Figure 19). Do not try to load any more than 7 cans into the car. Press "Unload" button of the controller to unload cans. Adjust track voltage until milkman unloads the cans vigorously but without knocking them over. The small magnets in the bottom of the cans help to keep them upright.

No. 3656 OPERATING STOCK CAR

The Operating Stock Car, which leads and unloads miniature cattle from a special corral platform does not use the regular remote control track but is operated instead by means of contacts built into the platform base.

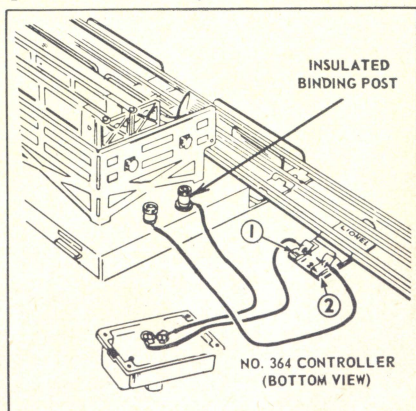


Figure 22

Electrical Connections for Platform

The platform base is assembled to a straight portion of the track (either "O" or "027" track may be used) and is wired to a track lockon and to a No. 364C Controller, as illustrated in Figure 22.

After the platform is properly assembled, line up the miniature cattle in any desired corral passage, position the car accurately in front of the platform and press the controller button. The car doors will open and the vibrating platform floor will cause the cattle to move into the car. If the sliding center car door on the opposite side of the car is left open, the cattle will pass through the car and come out again on the platform. If the sliding door is closed, the cattle will remain in the car.

SPECIAL OPERATING CONDITIONS

USE OF No. 167 WHISTLE CONTROLLER

No. 167 Whistle Controller must be used in conjunction with transformers which do not have a built-in whistle controller. When No. 167 controller is used, one of its posts must be connected to the No. 1 clip of the track lockon while the other is connected to the proper transformer binding post.

Types VW and ZW transformers have two built-in whistle controllers. If you wish to supply track voltage to more than two layouts with the same transformer you must use 167 Whistle Controllers for B-U and C-U pairs of transformer terminals.

Because of voltage losses in the controller itself, outfits using No. 167 external whistle controller require a transformer voltage setting from 3 to 4 volts higher than they do ordinarily. This is not due to any defect in the equipment, but to the design of the 167 whistle controller.

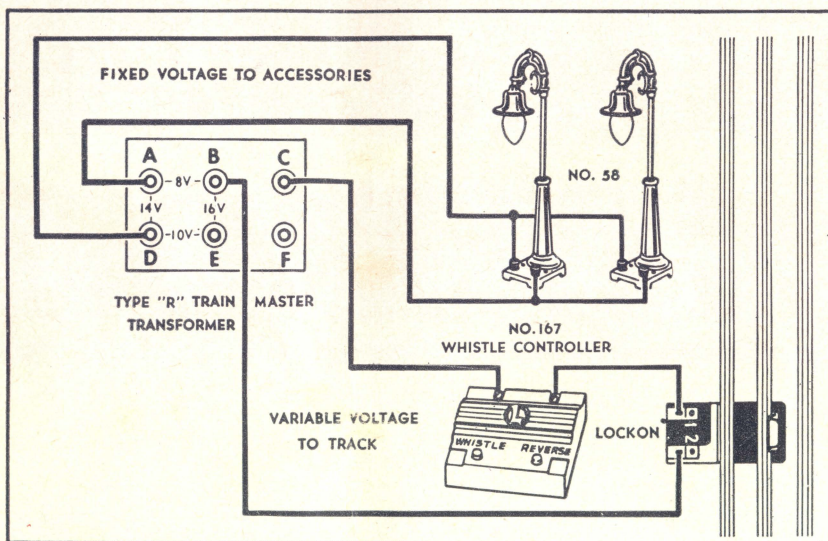


Figure 23—How to Install No. 167 Whistle Controller

D.C. OPERATION

Most Lionel equipment can also be operated on low voltage direct current, which can be obtained either from automobile storage batteries or from 32-volt d.c. generators sometimes used in rural areas where regular electric power is not available. When direct current is used trains require less voltage than when operated on regular alternating current obtained from a toy transformer. Two storage batteries in series generally furnish enough voltage, which is varied for controlling train speed by means of a rheostat.

If a 32-volt source is used the voltage must be reduced to approximately 12 volts by means of series resistance or a potentiometer.

As previously stated, Lionel train whistles cannot be controlled but will blow continuously when the train is operated with direct current or with alternating current having a frequency of less than 40 cycles. For further information on low-voltage d.c. operation write to Lionel Engineering Department.

PART TWO

HOW TO OPERATE LIONEL ACCESSORY RAILROAD EQUIPMENT

ABOUT LIONEL TRACK

LIONEL TRACK SIZES

Lionel track is made in two different sizes: "O" and the lighter "027". The quickest way to tell the difference between them is by the shape of the track ties. (See Figure 24). Although the track "gauge" or the distance between the running rails is the same for both types of tracks—1¼ inches—"O" and "027" track cannot be used for the same layout.

In addition to the regular length "O" track Lionel makes half-length straight and curved sections, known as ½OS and ½OC, which are useful for many types of layouts. This year Lionel has also made available special wide radius "072" curved track. These No. 760 sections are 14" long with 16 sections making a circle slightly more than 74 inches in diameter. "072" track matches "O" track but not "027". The three types of track are compared in Figure 25.

To aid in automatic signalling and operation of accessories Lionel also makes special insulated OSS (straight) and OCS (curved) sections matching "O" track.

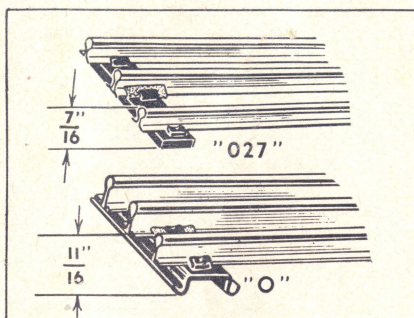


Figure 24—"O" and "027" Track

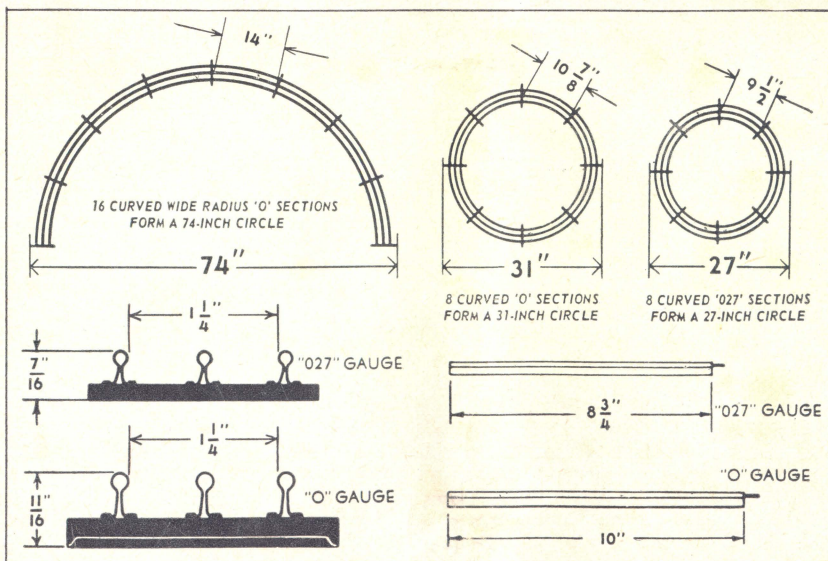


Figure 25—Comparison of Three Types of Lionel Track

LAYING THE TRACK

Lionel track is flexible so that it is possible to construct layouts which are not strictly symmetrical. However, be careful not to bend or distort the track too much or you will cause your train to derail. If you fasten your track to a wooden base it will be more secure and will insure better train operation. Small screws are best for this purpose, since they are easier to remove than nails. Don't screw down the track

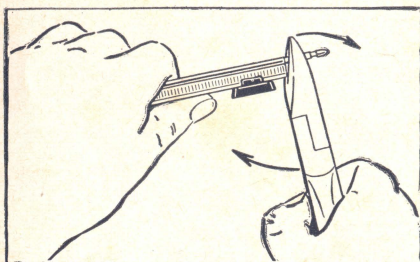


Figure 26—Removing Track Pins

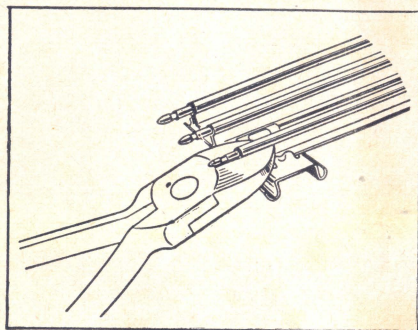


Figure 27—How to Tighten Pins in Track

insulating pins. This can be done most easily with a pair of diagonal pliers, as shown in Figure 26. Use the rail flanges as a lever point and work the pin out gradually. Try not to distort the rail. To tighten pins in the track, or to reshape distorted or enlarged rail openings apply the pliers as shown in Figure 27. Many model railroaders make their own special track pliers by filing a round groove the size of a rail in a pair of flat nose pliers.

REMOVING TRACK PINS

In many cases you may find it necessary to remove the steel pins from a track rail, either to place them into the opposite end of the rail or to replace them with fibre

TRACK SWITCHES AND CROSSINGS

Besides various straight and curved track sections, many layouts also require the use of track switches and crossings. Track switches, or "turn-outs" are used to connect two lines of track to enable the train to switch over to a different main line or a siding. Track switches are usually sold and used in pairs consisting of left hand and a right hand switch although single switches are available for use in constructing sidings. Lionel makes both electric remote control and manual, or hand-operated switches. Electric switches matching "O" track are No. 022; manual "O" switches are No. 042. Electric switches for "027" track are No. 1121; manual "027" switches are No. 1024.

Track crossings enable two lines of track to cross each other like a figure 8. For "027" track Lionel makes a 90-degree crossing No. 1021. For "O" track there is a 90-degree crossing No. 020 and a 45-degree crossing No. 020X. Crossings and hand-operated switches need no special wiring of any kind. They are inserted into the layout like any ordinary track sections; the steel track pins make the required electrical connections. In permanent layouts it is sometimes advisable to put a small spacer or "shim" underneath a track tie adjacent to a switch, in order to keep the level of the track and the switch rails even.

ABOUT TRACK SWITCHES

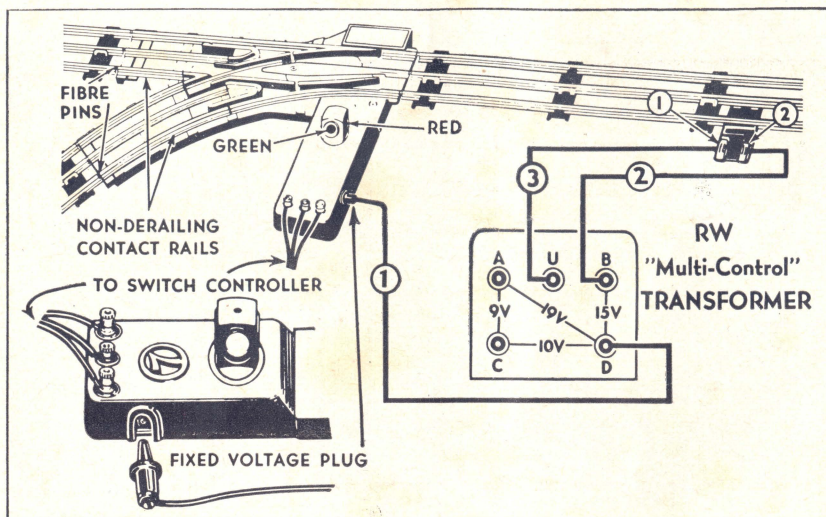


Figure 28—Installation for No. 022 Switch. For Other Transformers See Chart Below

No. 022 REMOTE CONTROL SWITCH

No. 022 switches are operated by controllers connected to the switch by 3-wire cables. Connect the center wire to the middle binding post of the switch. Connect the outside wires to the outside binding posts.

When the switch is properly installed, moving the controller lever throws the swivel rails of the switch either to permit the train to go along the straight-away, or to turn it onto the curved portion of the track. The switch and the controller are equipped with red and green lights which indicate the position of the swivel rail. When the switch is set for the train to go along the straight-away, green light shines in the controller and along the straight-away. When the switch is set for the train to go along the curved portion, red light shows in both places.

FIXED VOLTAGE PLUG

The Fixed Voltage Plug which is furnished with 022 switches makes it possible to get power for the switch directly from the transformer. Wire the plug directly to transformer following Figure 29.

The use of the Fixed Voltage Plug is optional. In small layouts it may not be necessary, for the switches will operate satisfactorily by drawing the current directly from the track. Connection is made automatically when Fixed Voltage Plug is removed.

TRANSFORMER	TRANSFORMER CONNECTIONS					
	LOW TRACK VOLTAGE			HIGH TRACK VOLTAGE		
	WIRE No.1	WIRE No.2	WIRE No.3	WIRE No.1	WIRE No.2	WIRE No.3
A-Q	LOW VOLTAGE NOT USED			C	A	U THROUGH 167
R	E	B	C OR F THROUGH 167	D	A	C OR F THROUGH 167
V-Z	A OR B	U	C OR D THROUGH 167			
S	C	B	U	C	A	U
RW	D	B	U	D	A	U
VW-ZW	B OR C	U	A OR D			
KW	D	C	A OR B	D	U	A OR B
No. 1033	NOT USED	B	U	C	A	U

Figure 29—Fixed Voltage Combinations in Various Transformers

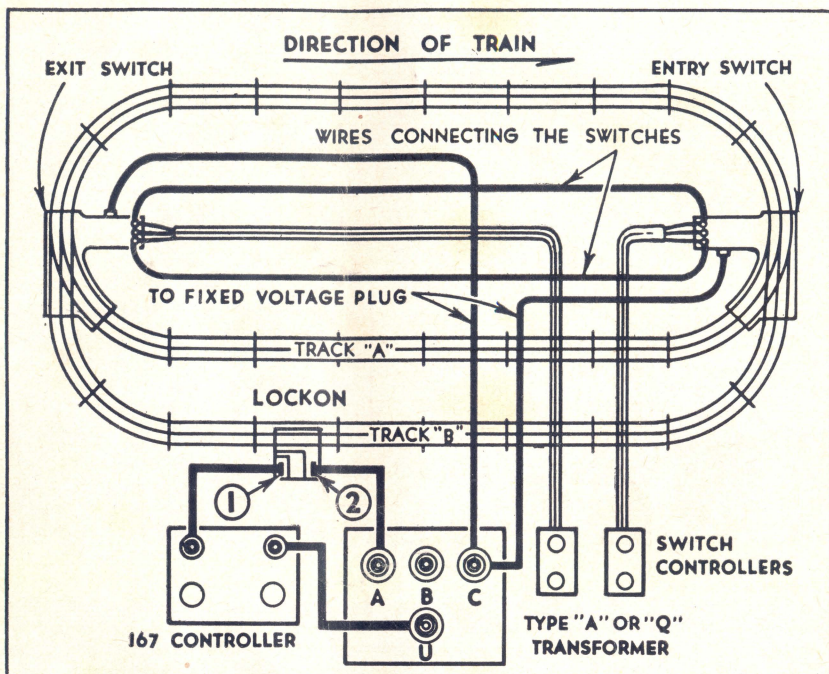


Figure 30—Layout for Automatic Switching of Train

NON-DERAILING OPERATION

No. 022 switches have a built-in safety device which prevents train derailment. This device automatically throws the swivel rails to the correct position to accommodate an approaching train. Notice that two rails of the switch are insulated from the track by fibre pins, as shown in Figure 28. They are part of the non-derailing feature. Do not take them out or replace them by steel pins or the switch will not operate. Remove pins only from adjoining track sections; do not disturb the switch.

An interesting use of the non-derailing device is illustrated in Figure 30. If the switches are connected as shown the train will alternate automatically between tracks "A" and "B."

REVERSING SWITCH MOTOR

The position of the "motor" unit in 022 and 042 switches can be changed from one side to the other, if necessary for a particular layout. Remove the two mounting screws indicated by "A" in Figure 31 and detach motor unit from the switch. Insert the motor in position on the opposite side as shown by dotted line. Make sure that the driving pin is properly inserted in slot of the swivel rail and replace the mounting screws. When reversing 042 switch, change position of inside lamp wire.

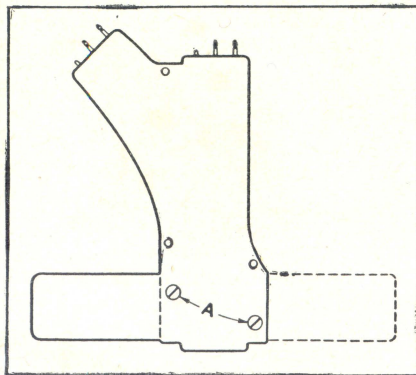


Figure 31—Reversing Switch Motor

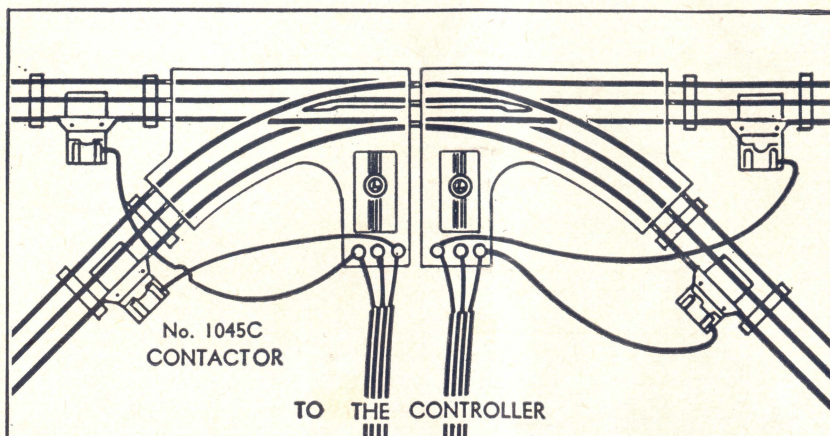


Figure 32—How to Connect No. 1121 Switches for Non-Derailing Operation

No. 1121 REMOTE CONTROL SWITCH

No. 1121 Switches are intended for use with "027" track. The procedure for installing these switches in the layout and connecting them to their controller is the same as for No. 022 Switches, described on preceding pages. No. 1121 Switches have no provision for supplying them with fixed voltage directly from the transformer, but draw their power from the track:

While No. 1121 Switches do not have a built-in non-derailing device; they can be made to operate automatically by a simple installation illustrated in Figure 32. Two No. 1045C Contactors are required for each switch. The contactors are clamped to straight track sections adjoining the two exit branches of the switch and are then connected to the terminals on the switch box, as shown in the diagram. Note that connectors clamped to the curved branches are wired to the right-hand switch terminals; those connected to straight-aways, to the left-hand terminals.

When proper connections are made, the wheels of the locomotive approaching an "open" switch automatically make the necessary electrical connection to throw the switch to correct position in order to prevent derailment. By varying the position and connection of contactors any switch in the layout can be made to operate automatically, opening and closing sidings and branch lines and routing trains according to a prearranged schedule.

No. 1024 and No. 042 MANUAL SWITCHES

Hand operated switches have no controllers or external wiring connections. They are inserted into the layout exactly as curved and straight track sections. The position of the swivel rail is changed by moving a hand lever. No. 1024 switches fit "027" track, No. 042 switches match the "O" and the "072" track.

Inexpensive and sturdy manual switches are particularly useful for infrequently used sidings, classification yards, etc., where remote control is not too important.

AUTOMATIC SIGNALLING

USING 145C CONTACTOR

Model railroad signals and track-side accessories made by Lionel are usually operated automatically by means of "contactors" actuated by a passing train. Some of the contactors are worked mechanically by the weight of the train. Others are operated electrically by the train wheels making an electrical contact with the contactor surface.

No. 145C Contactor is an "Off-On" electrical switch operated by the weight of the train and is furnished with No. 151 Semaphore, No. 145 Gateman and No. 252 Crossing Gate. Place the contactor underneath the track so that one track tie rests firmly on the lever plate of the contactor.

If placed under curve, the adjustment nut should be toward the center. Do not fasten down the track for several sections on either side of the contactor because the track must remain free to bend under the weight of the train. Then make the wire connections shown in the diagrams. After all connections are made and transformer power is on, adjust the contactor. With the train stopped on the track several sections away from the contactor, turn the adjustment nut either way until the signal operates, then turn the nut back just enough to return the signal to its normal non-operating position. By varying the tension of the adjustment nut the signal can be made to respond either to the weight of the heavy locomotive or to the lightest car.

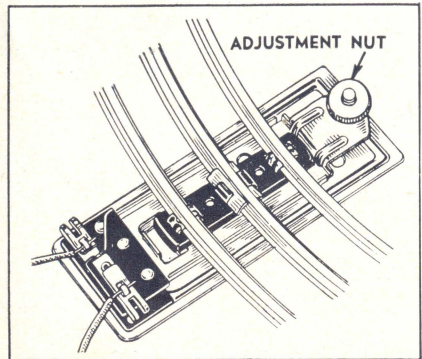


Figure 33—How to Install 145C Contactor

No. 252 CROSSING GATE

This accessory is connected to No. 145C contactor and transformer as shown in Figure 34. The order of wires connected to contactor does not matter. Note method for removing lamp bracket from base of Crossing Gate.

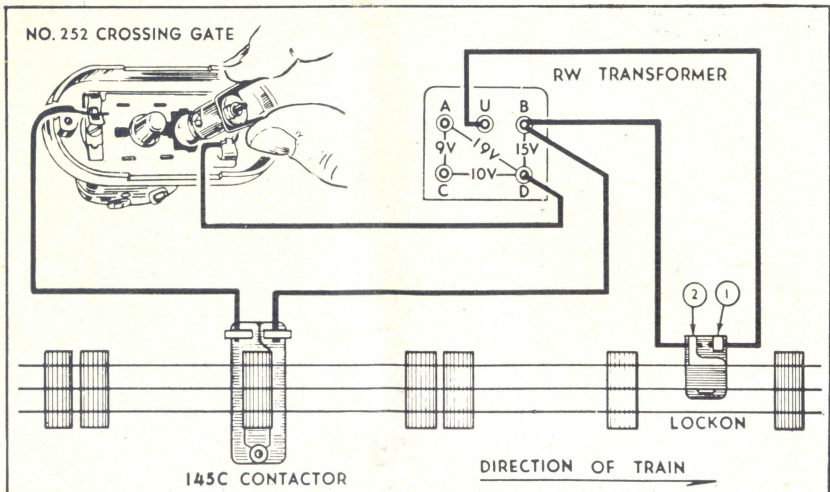


Figure 34—Connections for No. 252 Crossing Gate

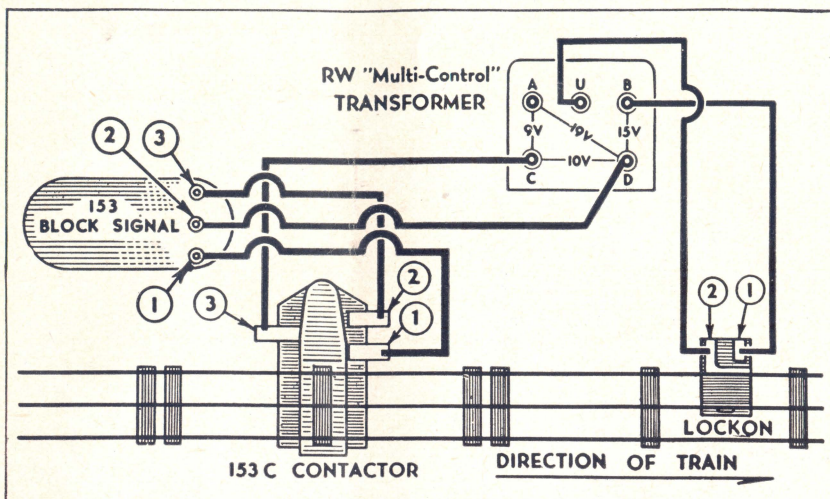


Figure 37—How to Connect No. 153 Block Signal

No. 153C CONTACTOR

No. 153C Contactor, furnished with 153 Block Signal, is very similar to No. 145 contactor and is installed and adjusted in the same way. Note, however, that it has three terminals instead of two so that it can control two electrical circuits, closing one while opening another. In No. 153 Block Signal, which has two separate lamps, the green light goes out and the red goes on as the train passes over the contactor.

Although the diagrams on these pages show a separate contactor for each signal, two signals located in different places in the layout can be connected to the same contactor so that the passage of the train operates both of them simultaneously. Such "parallel" connection, however, is recommended only with the larger transformers.

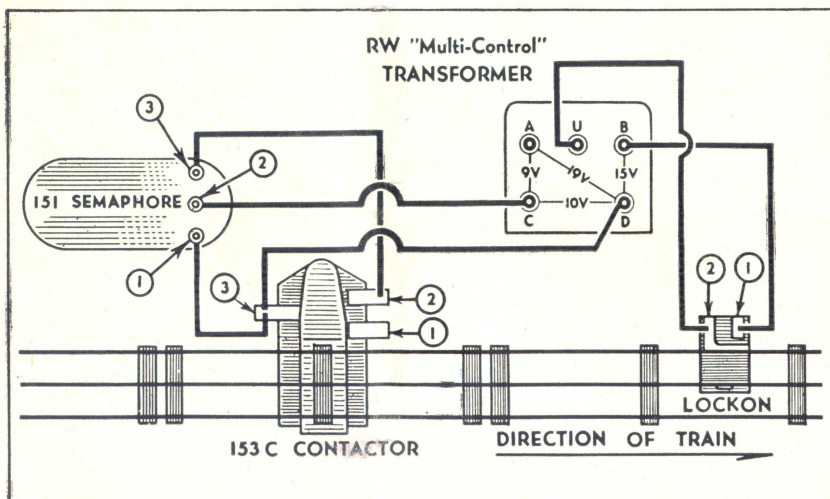


Figure 38—How to Operate No. 151 Semaphore with a No. 153C Contactor

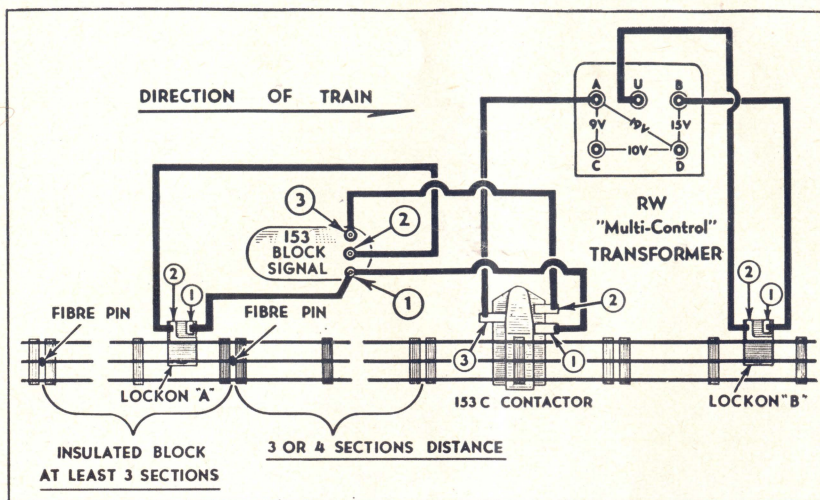


Figure 39—How to Run Two Trains with No. 153 Block Signal

OPERATING TWO TRAINS

By installing an insulated track block and using a 153C contactor to control its power supply, it is possible to operate two trains on the same layout. Usually either a 153 Block Signal or a 151 Semaphore is used with this installation for the sake of realism. Be careful to make all wiring connections exactly as shown. Note particularly that a portion of track at least three sections in length is insulated from the rest of the track by means of fibre pins inserted in the center rails at the ends of the block.

As train No. 1 crosses the contactor, it changes the position of the track signal to indicate "Stop" and at the same time cuts the power out of the insulated block. If train No. 2, running behind the first train, runs onto the insulated block at this time, it stops and waits until the first train passes the

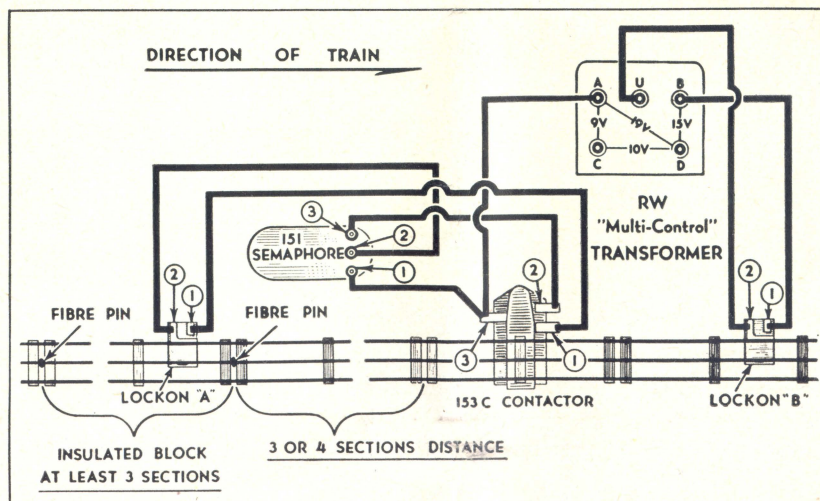


Figure 40—How to Run Two Trains with No. 151 Semaphore

contactor. After the last car of train No. 1 is off the contactor, the track signal changes to "Go", current flows back in the track block and the waiting train continues on its way. In this way, the second train can never overhault the first train, but always remains a safe distance behind it.

In order to give the waiting train a fast start, the current supplied to the insulated block through the contactor and Lockon "A" should be 2 to 3 volts higher than the current supplied to the rest of the track through Lockon "B".

NOTE: When operating two trains automatically don't forget to disconnect their reversing "E-Units", as described on page 6. Otherwise the trains, after being stopped, will not resume forward motion but will remain standing in "Neutral".

Two of the many possible layouts using 153C contactor and insulated track blocks for two-train operation are shown in Figure 41. The basic wiring of these layouts is the same as in Figure 39. If you use a 151 Semaphore instead of the 153 Block Signal follow wiring in Figure 40. The chart in Figure 42 shows the connections to most modern transformers.

Automatic operation of trains can also be accomplished by using special OSS and OCS insulated track. Diagrams illustrating this type of installation are found on page 44 in Part Three of this booklet. Many other variations of these installations can be worked out.

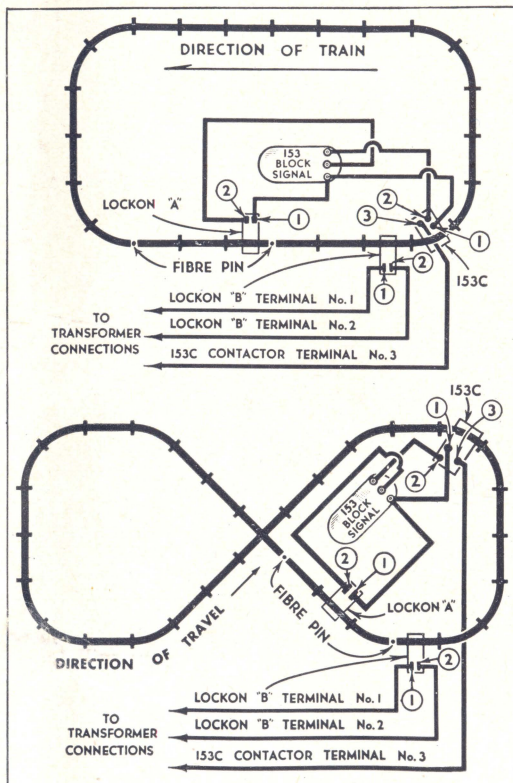


Figure 41—Typical Two-Train Layouts. For Transformer Connections See Table Below

Transformer Type	Lockon "B" Terminal No. 1	Lockon "B" Terminal No. 2	153 Contactor Terminal No. 3
1032, 1033, 1034 1041, 1042, "RW"	B	U	A
"VW" and "ZW"	A or D	U	B or C
"S"	U	A or B	C
"R"	C	A or B through 167	F
"V" and "Z"	C or D through 167	U	B or C

Figure 42—Transformer Connections for Two-Train Operation

No. 154 CROSSING SIGNAL

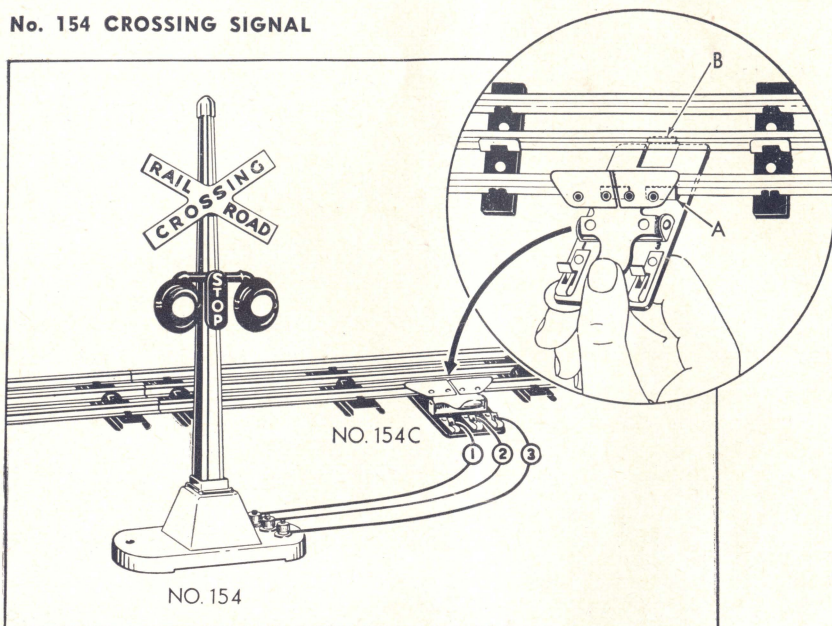


Figure 43—How to Install No. 154 Crossing Signal

No. 154 Crossing Signal is connected directly to the track by means of the No. 154C Contactor. Attach the contactor to the track by pressing down the spring lever to raise the contact plate as shown in the inset of Figure 43; then place contactor under the track with clip "A" gripping the flange of outside rail, snap spring clip "B" over the center rail, and release the spring lever.

As the wheels of the train roll over the contactor surface, the red warning lights of the Crossing Signal will blink alternately.

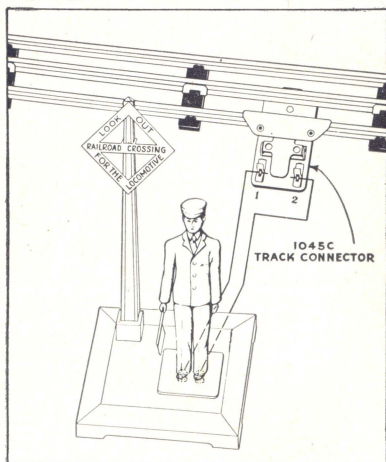


Fig. 44—Connecting the Operating Flagman

No. 1045 FLAGMAN

An accessory somewhat similar in operation to No. 154 Crossing Signal is No. 1045 Operating Flagman, who waves a warning flag as the train goes by a crossing.

The Flagman is connected directly to the track by means of the No. 1045C Contactor which is clamped on to any section of straight track in the same way as No. 154C Contactor. No. 1045 Flagman and its track connections are shown in Figure 44. You will notice that the inside of contact plate of both 1045C and 154C Contactors has a layer of insulating paper. This layer keeps the electrical circuit normally open. Whenever a car truck passes over the contactor the circuit is completed through the car wheels and the flagman operates. Keep top of contactor clean.

ILLUMINATED ACCESSORIES

A wide variety of Lionel illuminated accessories, such as lamp posts, station platforms, floodlights, beacons, and other realistic pieces of model railroad equipment, is available. The voltage required by various illuminated accessories depends upon the lamps used. With few exceptions it is generally 12-14 volts.

Illuminated accessories should be connected directly to the transformer whenever possible. After you have found what voltage is required, (See Page 34) select the pair of binding posts which give nearest to the required voltage and connect them to the binding posts or contact clips of the accessory.

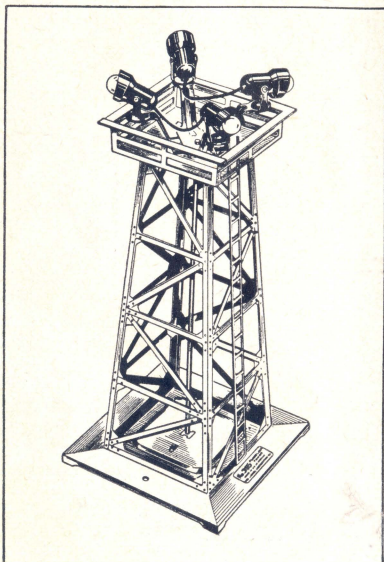


Figure 46—No. 395 Floodlight Tower

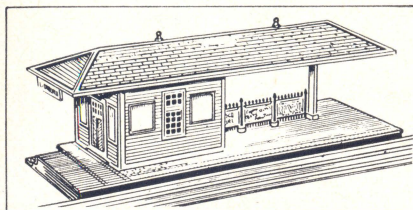


Figure 45—No. 256 Freight Shed

When illuminated accessories are connected to binding posts whose voltage is not "fixed" but is controlled by dials, such as in transformers VW or ZW, take care not to turn the voltage control to a point greater than specified for the accessories, or the lamps will be quickly burned out. As a general rule the life of the lamps will be greatly extended if they are operated a little below their rated voltage.

PARALLEL CONNECTIONS

In the event you have several illuminated accessories requiring the same voltage it is advisable to use the same pair of transformer binding posts for all of them, wiring them together in "parallel" as shown in Figure 47. Two main feeders go to the transformer posts and individual wires go from these feeders to the accessories. In this way unnecessary wiring is eliminated.

Remember that if two or more 14-volt accessories are wired together in "parallel", they must still be connected to the 14-volt posts on the transformer and not to posts which give the total of the voltages required by individual accessories.

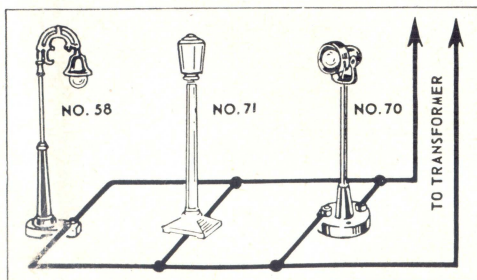


Figure 47—Parallel Wiring of Accessories

OPERATING ACCESSORIES

Lionel manufactures a number of realistic operating accessories which duplicate the activity of real railroad equipment. All of these accessories depend on the transformer for their operating power and work on voltages ranging from 10 to 14 volts, depending upon the accessory itself. The higher portion of this range is generally required when the motor and the working parts of the accessory are new, but the voltage can usually be decreased as the mechanism becomes worn in. It is good practice to run any Lionel operating accessory on the lowest possible voltage. In this way you will prevent unnecessary wear and prolong the life of the equipment.

While variable voltage is supplied to the track for controlling the speed of the train, the majority of operating accessories should be connected directly to the fixed voltage terminals of the transformer. Select that combination of terminals which furnishes the proper voltage for operating your accessory. (See page 34). When using a VW or ZW Multi-Control transformer, where the voltage for operating accessories as well as that for running trains may be set at any desired point, turn the voltage control to the lowest voltage where you get satisfactory operation.

The number of operating accessories which can be used with your model railroad is limited only by the wattage rating of your transformer as discussed in the section on Power Supply. In most cases, however, since these accessories consume power only when in actual operation, many more of them can be operated on a transformer than the total of their wattages would indicate.

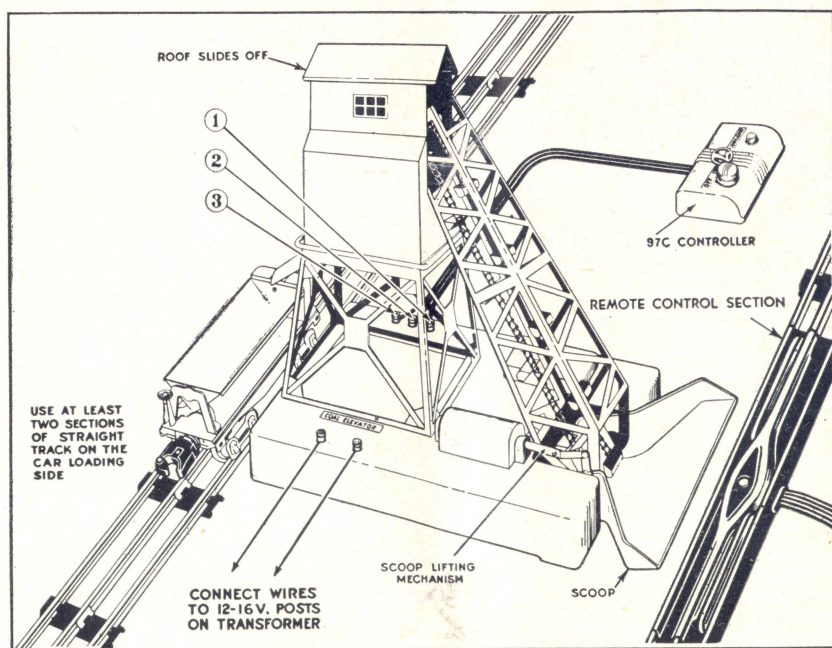


Figure 48—Installation for No. 97 Coal Elevator

No. 97 COAL ELEVATOR

Lionel No. 97 Coal Elevator is installed between two lines of track approximately 14 inches apart with a remote control section inserted in one of the lines. See Figures 48 and 49. Lionel artificial coal can then be unloaded from dump cars into the automatic tilting scoop of the elevator where it is picked up by the bucket conveyor and carried to the storage bin on the top of the elevator. The car is then rerouted beneath the delivery chute on the other side of the elevator and there reloaded. No. 97C Controller supplied with the elevator has a button for controlling the gate of the elevator storage bin and an "On-Off" switch for controlling the motor-driven bucket conveyor.

WARNING

Only Lionel Artificial Coal should be used in the accessory. Any other material may clog or bind the conveyor belt.

The motor of the Coal Elevator should be lubricated periodically paying particular attention to the ends of the armature shaft. However, the sprockets or any other part of the conveyor should never be lubricated or pieces of coal will stick to it and jam the conveyor mechanism.

No. 164 LUMBER LOADER

Similar in operation to No. 97 Coal Elevator is No. 164 Lumber Loader illustrated in Figure 50. The Lumber Loader is placed in a layout similar to that used for the Coal Loader. It is especially appropriate for use with remote control Lumber Cars. These cars will unload lumber into the bin on one side of the Loader. The lumber is then picked up by the conveyor chain and transported to the upper storage platform. Pressing the "Unload" button on 97C Controller will release stored lumber into waiting lumber cars. Like the Coal Elevator, the Lumber Loader should be connected to fixed voltage transformer posts furnishing 12-16 volts.

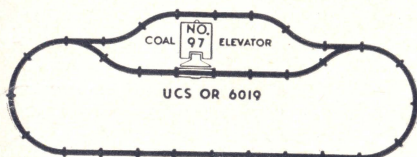


Figure 49—Typical "O" Layout for Coal Elevator or Lumber Loader

TRACK NEEDED: 13 sections of straight track, 14 sections of curved track, 1 pair of switches, 1 Remote Control Section.

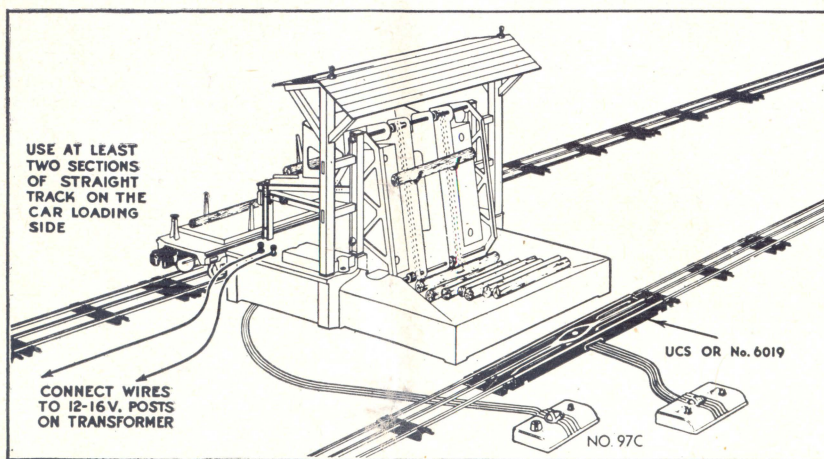


Figure 50—How to Install No. 164 Lumber Loader

**No. 364 LUMBER LOADER AND
No. 397 COAL LOADER**

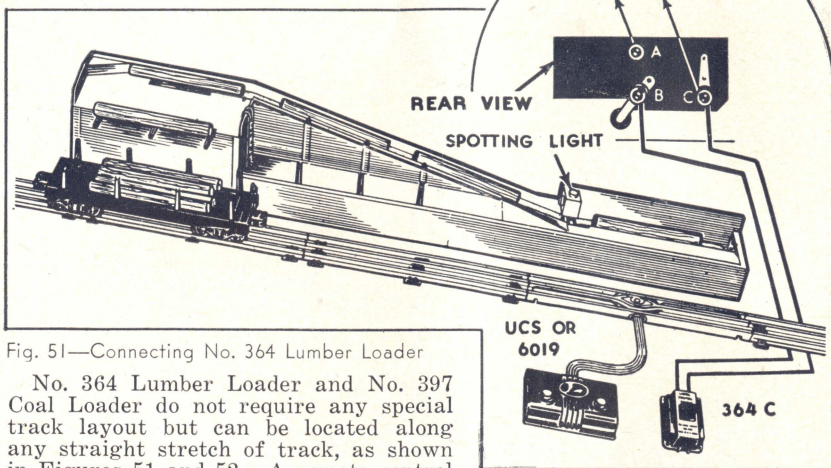


Fig. 51—Connecting No. 364 Lumber Loader

No. 364 Lumber Loader and No. 397 Coal Loader do not require any special track layout but can be located along any straight stretch of track, as shown in Figures 51 and 52. A remote control section is placed in front of the accessories in such a way that operating lumber or coal cars can be unloaded into the receiving bins. Motorized conveyor belts then carry the material from these bins and reload it into the waiting empties. Note that in the case of the Coal Loader the coal car is loaded and unloaded from the same position on the Remote Control Section, while in the case of the Lumber Loader the empty car must be moved over to the loading station in order to be reloaded. Adjust the location of the accessories until you obtain good loading and unloading action.

The conveyor belts in both the Lumber and the Coal Loaders are started and stopped by means of the 364C Controller, shown in Figure 52.

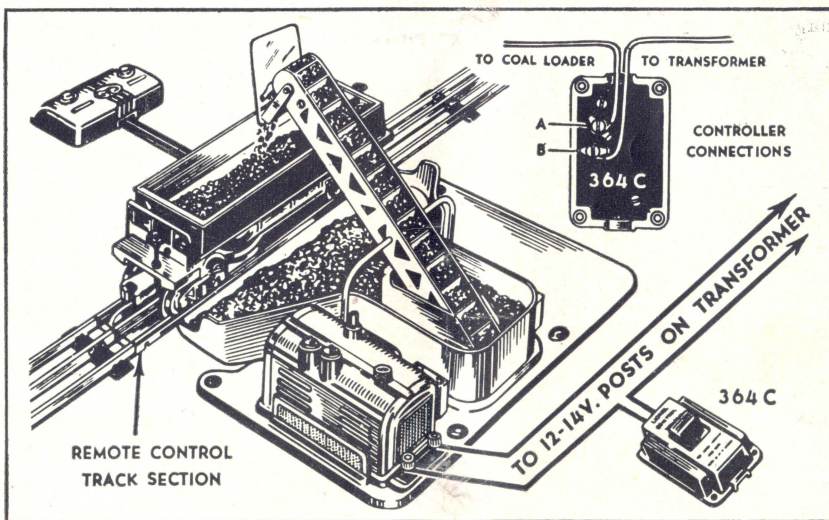


Figure 52—Connection for No. 397 Coal Loader and Its Controller

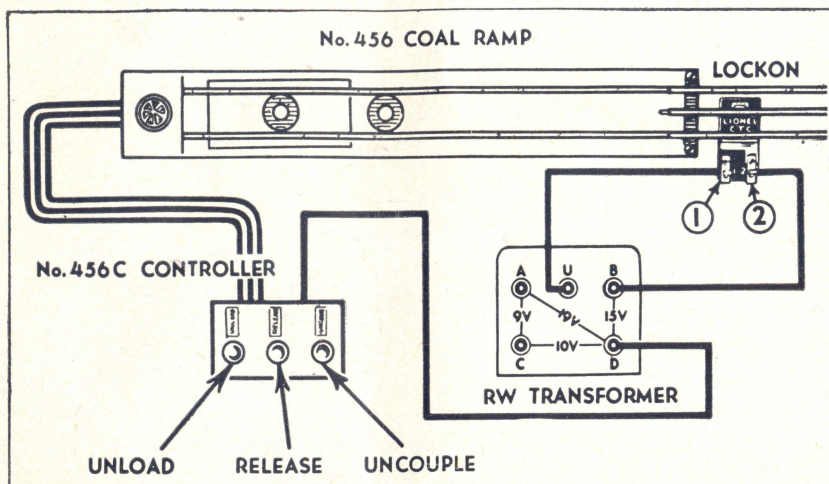


Figure 53—How the Coal Ramp is Installed at the End of a Siding

No. 456 COAL RAMP SET

No. 456 Coal Ramp Set consists of the elevated ramp and a special operating Hopper Car. It can be used with either "O" or "027" layouts. The ramp is installed on the end of a siding, and is fastened to it by means of two screws furnished with the set.

The Ramp is operated by means of a three-button controller which is wired to the ramp and to the transformer as shown in Figure 53. The three-wire cable is connected to the three clips on the bottom of the trestle. Connect the center wire to the center clip and the outside wires to the outside clips. Do not twist the cable. If the action of the ramp does not correspond to the controller buttons interchange the two outside wires. The separate fourth wire coming out of the controller supplies power for the ramp and should be connected to a fixed voltage post of the transformer (See page 17) or to No. 1 clip of a track lockon.

To operate the Hopper Car couple it to the end of the train. (The train must be at least the length of the ramp.) Then back the train up onto the ramp until the Hopper Car latches to the bumper on top of the ramp. Pressing "Uncouple" button will separate the Hopper Car and the train leaving the car on top of the ramp and allowing rest of the train to depart. To dump the coal from the car to the bin underneath the ramp push the "Unload" button. To release the car from the bumper push the "Release" button.

If desired, the Coal Ramp can be operated in conjunction with the No. 397 Coal Loader by mounting the bin on the loader base using two posts supplied with the Ramp.

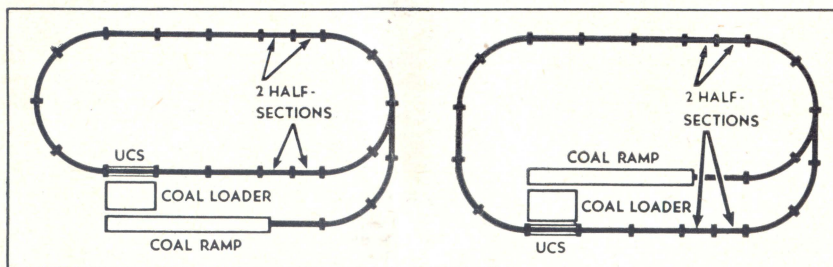


Figure 54—"O" Layouts for Joint Operation of Coal Ramp and Coal Loader

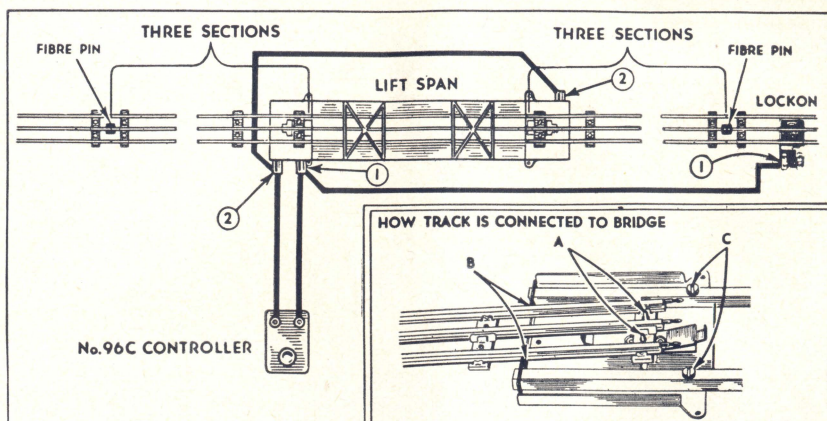


Figure 55—Installation of No. 213 Lift Bridge

No. 213 LIFT BRIDGE

No. 213 Lift Bridge can be used with either "O" or "027" track. The bridge is approximately equal in length to two straight track sections. No adjustments or special sections are required. The track is sufficiently flexible to make up for the small differences in length.

The bridge is installed simply by fitting two regular straight track sections to both ends of the bridge so that the holes in the track ties fit over the locating tabs on the base of the bridge piers ("A" in Figure 55). The outside rails snap into clips in the base at "B". Be sure to insert three track pins into the rails at both ends of the bridge. Extra pins to fit both "O" and "027" track are furnished with the bridge.

Note that three-section blocks of track at each end of the bridge are insulated from the rest of the layout by means of fibre pins inserted in the center rail. The purpose of these insulated sections is to halt the train when the bridge span is up. Wiring of the bridge is completed by running a wire between post No. 1 and clip No. 1 of a track lockon and by connecting the two No. 2 posts on the opposite sides of the bridge.

The action of the bridge is started by pressing the button of No. 96C Controller which is wired to the two binding posts on the bridge. As the bridge starts to rise power is cut out of the bridge approach sections halting the train. After the lift span reaches its highest position the action is reversed automatically and the bridge descends. After the lift span is once more in place the approach sections are energized allowing the waiting train to restart.

NOTE: When operating a layout with the Lift Bridge disconnect the locomotive reversing unit, as shown on page 6. Otherwise it will trip to neutral position as the train enters the insulated block and the train will not restart automatically.

If the bridge is actually used to span a chasm and to provide the extra clearance in raised position, the base U-channel can be removed. First fasten the bridge piers with 3 No. 4 screws on each end of the bridge. Then raise the bridge, remove 2 screws "C" and slide the U-channel out.

By installing a 153C or a 145C contactor as described on page 20, instead of the 96C Controller, it is possible to obtain operation so that the weight of the train passing over the contactor will start the bridge motor. Pressing the controller or the contactor again, once the bridge starts coming down will stall the motor. The contactor should be placed far enough away from the insulated bridge approach so that the waiting train does not keep pressing the contactor.

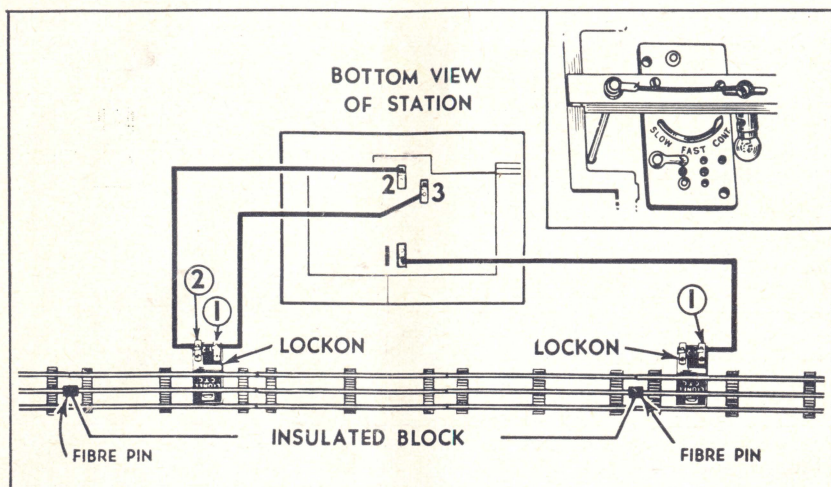


Figure 56—How to Install No. 132 Automatic Station

No. 132 AUTOMATIC PASSENGER STATION

Lionel No. 132 Station is equipped with automatic train control which stops and restarts the train in front of the station. The station is located anywhere along a straight stretch of track. Note that an insulated block consisting of three or four sections of track is placed directly in front of the station. Two track lockons are used in this installation, one placed inside the insulated block, and one outside, and are wired to the clips on the bottom of the station as shown in Figure 56.

The length of time a train remains standing in front of the station is regulated by a control lever located underneath the roof of the station as shown in the inset of Figure 56. The simplest way to adjust the station is to start with the control lever at "Continuous" position and gradually move it toward "Slow". Allow the train to make several circuits in each position of the lever before moving it to a new spot.

NOTE: Don't forget to disconnect the reversing unit in the locomotive (See page 6). Otherwise it will trip to neutral position when the train enters the insulated block and the locomotive will not restart automatically.

No. 30 WATER TOWER

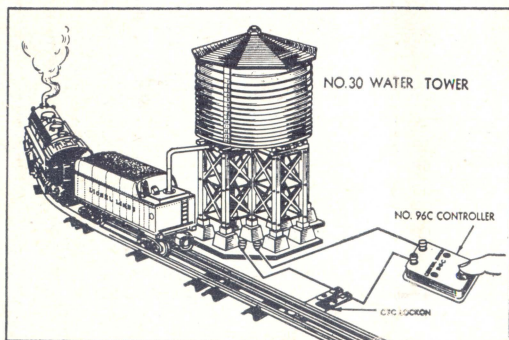


Figure 57—How to Connect Water Tower

No. 30 Water Tower is wired either to a pair of fixed voltage terminals of a transformer or directly to track by means of a Lockon. (See Fig. 57).

To operate the Water Tower press No. 96C Controller button. The spout will drop to "fill" the water tank in the tender. When the button is released the spout will lift. If operation of water tower is sluggish raise track voltage slightly before pushing button.

No. 394 ROTATING BEACON

Electrical connections to this accessory are made by inserting bare ends of connecting wires into the clips on the bottom of the beacon. After electrical connections are made and power is on, lower the rotating lens housing carefully over the beacon lamp so that the pivot rests in the small cup on top of the lamp.

After a minute or two the lamp will heat the air inside the housing. This air streaming through the vanes on top of the housing will cause it to turn slowly. If you wish you can start it off by spinning it gently in clockwise direction. If rotation of housing stops, move the pivot slightly to a different spot in the lamp cup.

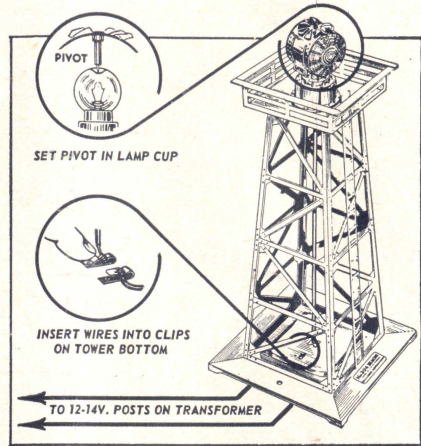


Figure 58—No. 394 Rotating Beacon

NOTE: To make sure that the beacon operates at normal speed keep it out of drafts. The housing is so light that a slight air current will interfere with the motion.

No. 455 OIL DERRICK

No. 455 Oil Derrick operates best on fixed voltage ranging from 10 to 15 volts. After the connections are made to two binding posts located on the bottom of the derrick, its "walking beam" pump will operate with a slow rocking motion. The speed of action can be regulated by means of an adjusting screw.

The lamp which illuminates and warms the bubbling oil column is mounted in a hinged bracket on the base of the derrick. In Figure 59 it is shown in open position, ready for removal. In operating position it is snapped shut.

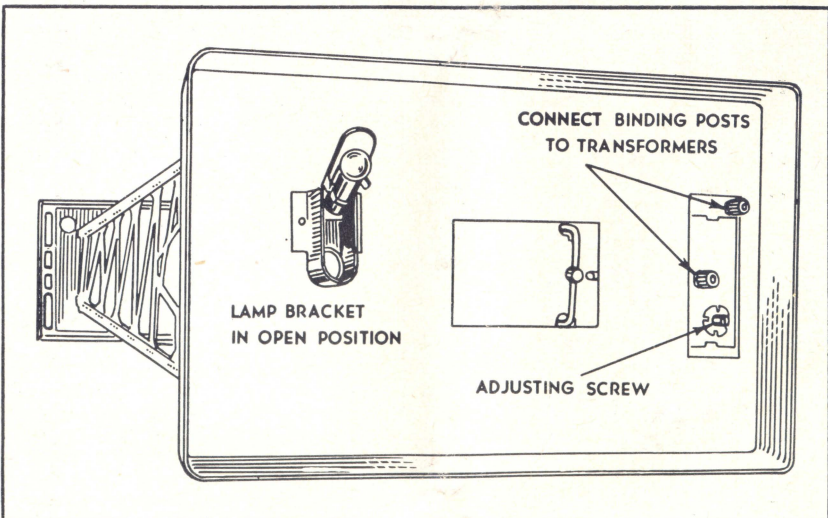


Figure 59—Bottom View of Pumping Oil Derrick

VOLTAGES REQUIRED BY ACCESSORIES

Because the actual voltages may vary somewhat from the voltages indicated on binding posts, it is not practical to give a hard and fast rule for connecting accessories to a particular pair of transformer terminals. The actual working voltages required by Lionel accessories are given in the chart below. The best practice is to connect the accessory to a pair of transformer posts which have a slightly higher indicated voltage than that required by the accessory. If the accessory does not operate with enough snap shift to the next higher available voltage.

In wiring unusually large layouts many model railroaders use a separate transformer to supply power for their lights and illuminated accessories. In this way, a variation in the load of the main transformer does not affect the voltage supplied to the accessories.

Illuminated Non-Operating Accessories		
58 Lamp Post 70 Floodlight 71 Lamp Post 256 Freight Shed 394 Beacon 395 Floodlight	12-14 volts	Use fixed voltage slightly lower than that specified, to prolong lamp life. These accessories can be connected in parallel as shown in Figure 47.
Automatic Signals		
145 Gateman 151 Semaphore 153 Stop Signal 252 Crossing Gate	10-14 volts	These accessories receive fixed voltage through No. 145C or No. 153C Contactors. See pages 20, 21 and 22.
154 Highway Signal 1045 Flagman	9-14 volts	These operate on track voltage received through special contactors.
Track Accessories		
26 Bumper 213 Lift Bridge 1121 Switches LTC Lockon	9-14 volts	Track voltage. No wiring required.
*022 Switches	10-14 volts	Track voltage (no wiring) or Fixed voltage. (See chart on page 17)
*6019 or UCS Track	9-14 volts	Track voltage (no wiring) or Fixed voltage.
*456 Coal Ramp	9-14 volts	Track voltage (Through Lock-on) or Fixed voltage.
* Since these accessories are a part of the track system, the fixed voltage circuit used must have the same "ground" as the track circuit, or a "short" will result. When making connections to transformer be sure to follow chart on page 17.		
Operating Accessories		
97 Coal Elevator 164 Lumber Loader 364 Lumber Loader 397 Coal Loader 455 Oil Derrick	10-14 volts	These accessories operate on fixed voltage. They can be connected to any pair of transformer posts having a nominal voltage from 12 to 16 volts.
30 Water Tower 125 Whistle Station	9-14 volts	Track voltage through Lockon.

ABOUT YOUR POWER SUPPLY

HOUSEHOLD POWER LINES

Lionel electric trains and accessories operate on low voltage ranging from 8 volts to 18 volts, depending on the type and size of the locomotive and train and on the rated voltage of the lamps used in illuminated accessories. This low voltage is generally stepped down from the regular house power lines by means of a Lionel transformer.

While the house power supply used in this country is usually 110 to 125 volts, 60-cycle alternating current (AC), there are a number of exceptions. Some parts of California use 50-cycle current; some areas in Canada employ 25-cycle current, while some downtown areas in New York City still use 110-volt direct current (DC) with which a transformer cannot be used without a special DC-to-AC *inverter*.

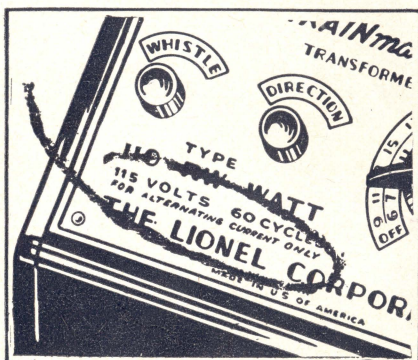


Figure 60—Transformer Rating

The regular Lionel transformers are designed to work on 110 to 125-volt, 60-cycle, alternating current. Other combinations of voltage and frequency (cycles) require special transformers which are available although they may not be listed in the general catalogue. The voltage and frequency ratings of transformers always appear on the transformer panel. They must correspond to the rating of your power line, or the transformer may be severely damaged. In case of doubt always ask your electric company about the type of power you have before buying or installing any equipment which is to be plugged into your wall outlets. If

you have a special problem consult your Lionel Dealer or write to The Lionel Corporation.

VOLTAGES SUPPLIED BY LIONEL TRANSFORMERS

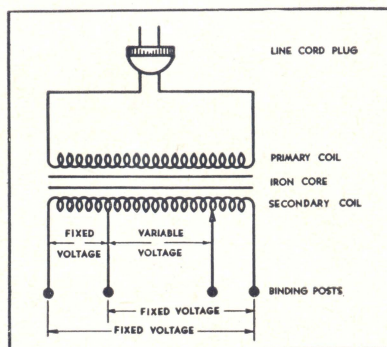
The following chart lists all nominal voltages supplied by the most popular 1950 Lionel transformers.

	Watts	Posts	Voltage			Watts	Posts	Voltage	
			Fixed	Variable				Fixed	Variable
1033	90	A-B	5		KW	190	A-U		9-19
		B-C	11				B-U		6-16
		A-C	16				C-D	14	
		A-U		5-16			C-U	6	
		B-U		0-11			D-U	20	
*1034	75	A-B	6		ZW	275	A-U		6-20
		B-C	14				B-U		6-20
		A-C	20				C-U	None	6-20
		A-U		10-20			D-U		6-20
		B-U		4-14					
RW	110	A-C	9						
		A-D	19						
		B-D	15						
		C-D	10						

* This transformer has no built-in whistle controller.

HOW TRANSFORMERS OPERATE

A transformer consists essentially of two coils of insulated copper wire wound on a common iron core. Although the two coils are completely insulated from one another, an alternating voltage imposed on one of the coils (which is then termed the *primary* coil) electro-magnetically induces a voltage in the other, or *secondary*, coil. The relation between the two voltages depends on the ratio of the number of turns in the two coils. In *step-down* transformers the secondary winding has fewer turns than the primary winding and, consequently, the secondary voltage is lower than the primary or line voltage in the same ratio.



Schematic Diagram of a Lionel Transformer

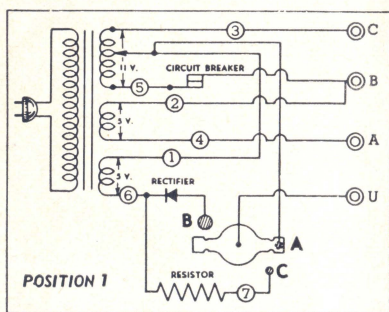


Diagram of "Multi-Control" Transformer No. 1033

POSITION 1. In the normal position the spring contact of the whistle control switch connects the variable voltage winding at contact rivet "A" to the transformer output binding post.

POSITION 2. As the switch is rotated clockwise, the contact spring makes contact with rivet "B". This produces the momentary high d.c. "pickup" surge to close the whistle relay.

POSITION 3. At the end of the swing the contact spring makes contact with rivet "C" thus connecting the resistor wire in parallel with the rectifier. In this position most of transformer current by-passes the rectifier leaving enough d.c. "holding" voltage to keep the relay closed.

Turning the control arm in counter-clockwise direction, shown in **POSITION 4**, disconnects the transformer output from the output binding post causing the locomotive reversing unit to operate.

MULTI-CONTROL TRANSFORMERS

The name "Multi-Control" is applied to those Lionel transformers which are equipped with built-in controls for operating the train whistle and for reversing the direction of the train.

The built-in whistle controller converts a portion of the transformer a.c. output into d.c. voltage to operate the whistle relay in the tender.

An important feature of "Multi-Control" transformers is a compensating winding which is switched into the circuit automatically to make up for the voltage drop in the rectifier and for the load of the whistle motor.

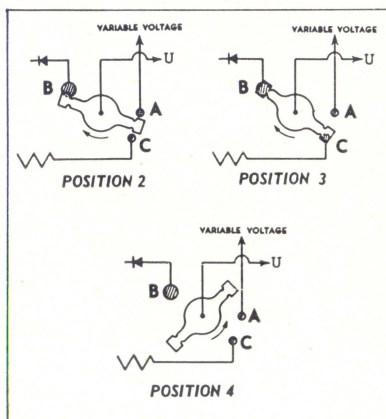


Diagram Showing the Operation of Whistle and Reverse Control in "Multi-Control" Transformers

ABOUT WATTAGE

In addition to their voltage and frequency rating, all transformers also bear a wattage rating. The wattage of a transformer corresponds to its *capacity*, or ability to furnish power. While the voltage and frequency of the transformer you must use are determined by the available power line, the selection of its wattage is guided by the size of your outfit and the number of lights and operating accessories. In planning to expand your railroad always estimate the power you will need to find out if your transformer will be adequate. *It is always wisest to get a transformer larger than the one you require for your immediate needs to provide power for future expansion.*

As a transformer becomes warm when in use its output normally diminishes. Because of this fact not more than three-quarters of its rated wattage should be drawn from a transformer continuously.

POWER REQUIREMENTS

The following table lists the power in watts used by various model railroad components:

"027" locomotive	25-35*
"O" locomotive	30-40*
Smoke generator	5
Operating accessories	10-40
Automatic track signals	10-15
Each 6-volt lamp	1.5
Each 14-volt lamp (small)	2.
Each 14-volt lamp (large)	3.
Each 18-volt lamp	5.

* These wattages are drawn by locomotives when pulling the regular number of cars and include the power used by the whistle. However, you must add the power used by lamps in illuminated cars.

Power requirements of automatic couplers and operating cars need not be added in the total since couplers draw current only for an instant and operating cars only when the train is not running. For the same reason do not add the power used by such accessories as the Lumber and Coal Loaders, Automatic Lift Bridges, and others. All such accessories can be generally used even with the smallest transformers, provided that they are operated when the train is standing still.

Accessory lights and equipment containing steadily burning lamps, such as switches and switch controllers, use a considerable amount of power and should be added in the total power requirements.

The following table can be used as a guide for the selection of additional accessories for your outfit or for a more adequate transformer for your railroad system.

Transformer	Capacity	Recommended for Operating the Following
1033	90 watts	One "027" outfit with smoke and whistle; few track or signal accessories.
RW	110 watts	Any "O" outfit with smoke and whistle; few switches and other accessories.
KW	190 watts	Two "O" outfits with smoke, whistle, switches and other accessories.
ZW	275 watts	Any practical railroad system with two or more trains, etc.

ABOUT VOLTAGE

A few words about voltage may help you understand the operation of your transformer so that you can use it to the best advantage. The "fixed" voltages marked on your transformer panel or the voltages indicated by your transformer voltage control at any particular setting are almost never the actual voltages delivered to your track or your accessories. The reasons for this variation are several. The voltages marked on your transformers are "nominal". That is, they are accurate only under certain specified conditions: when the line voltage fed into your transformer is just 115 volts and when *no current is drawn* from the transformer. Actually, the line voltages may vary from 125 to 110 volts, or even lower, depending on the standards in your locality and on how much electricity is being used at a particular time. This variation, naturally, results in a comparable variation in the output voltage of the transformer. If your train seems to run slower during a sudden storm it's probably because hundreds of people in your neighborhood had switched on their lights and so depressed the line voltage.

In the same way that a heavy demand for power may lower the voltage in your neighborhood, a heavy load on your transformer lowers *its* output voltage as well. For example, the fixed binding posts which are marked 14 volts may, under actual operating conditions deliver only 12 volts, or even less. In the case of a short circuit so much current is drawn from the transformer that its voltage drops to 2 or 3 volts—too low to operate the train or even light the lamps.

In addition to the voltage loss in the transformer itself, commonly called the "regulation" of the transformer, still further voltage losses occur in connecting wires. For this reason wiring of a large layout should be carefully planned. If a platform is used, the wiring is best located on the under surface of the platform. All wires should be as short as possible. To keep your wiring to a minimum, accessories which require the same voltage, should be ganged up in "parallel," as shown in Figure 47. This "feeder" system can be used for wiring operating accessories as well.

USING AUXILIARY LOCKONS

In operating large layouts it is frequently found that the train slows down when running on the portion of track farthest from the Lockon. This

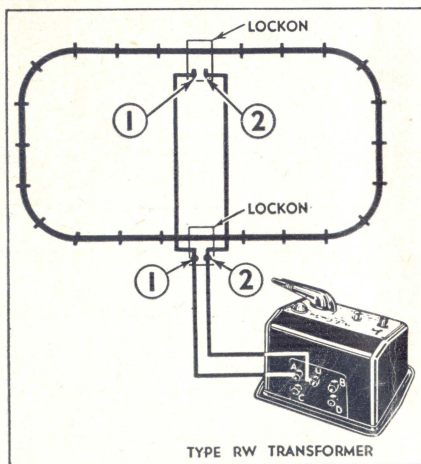


Figure 61—Using Voltage Lockons to Offset Voltage Losses

is due to voltage losses in the track itself and can be remedied by attaching additional Lockons at the points on the track where the train slows down. See Figure 61. Be careful to connect the No. 1 and No. 2 clips of the auxiliary Lockons to similarly numbered clips of the Lockon connected to the transformer or else a short circuit will result. Ordinary lamp cord is well suited to these connections as well as for "feeders" described above.

The main part of voltage losses in the track is due to loose connections. These loose connections can be frequently detected by the heating effect of poor electrical contacts. After the layout has been in operation for a half hour or so, run your finger down the rails. Loose rail joints will then become apparent as hot spots on the track.



One of the most fascinating things about owning a miniature train is the planning and building of a model layout that has all the features of an actual railroad system. With Lionel's wide selection of tracks and accessories—and now, "Magne-Traction"—it is easy to duplicate any of the operations of the big roads. Like all hobbies, model railroading develops slowly. You can start with a layout that fits your income, and add to it year by year.

PLAN FOR THE FUTURE

First step is to get out your pencil and put down a few ideas that will guide you in your planning. How much space is available for your complete layout? It is better to overestimate your space requirements than to find yourself later in cramped quarters, that will necessitate ripping up track and starting over. Next, how much rolling stock do you have, and how much more do you plan having?

When you plan your first track layout, be sure to allow for future growth of your rail system. As you add to your rolling stock you will want more sidings, classification yards, wyes, reverse loops. The siding in today's layout may tomorrow become a complete new branch of your railroad empire.

At the right you will see a few of the simpler types of starting layouts. These are "O" track. "027" layouts will be slightly smaller.

PART THREE

HOW TO BUILD A MODEL RAILROAD

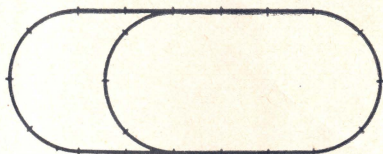


Figure 1.—Overall dimensions: 82" x 32".
Track requirements: 8 sections straight,
10 sections curved, pair of switches.

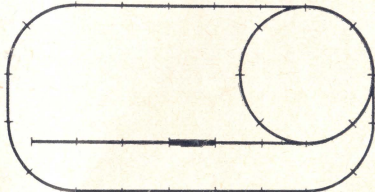


Figure 2.—Overall dimensions: 82" x 41".
Track requirements: 14 sections straight,
9 curved, 3 switches, 1 remote control
section.

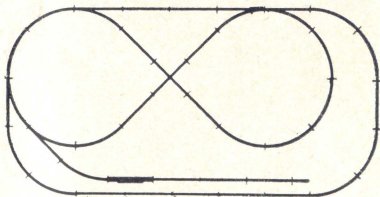


Figure 3.—Overall dimensions: 82" x 41".
Track requirements: 15 sections straight,
14 sections curved, 5 switches, one 90°
crossover, one remote control section.

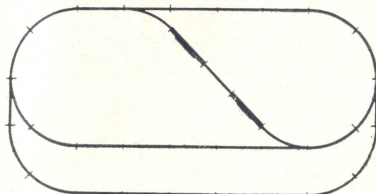
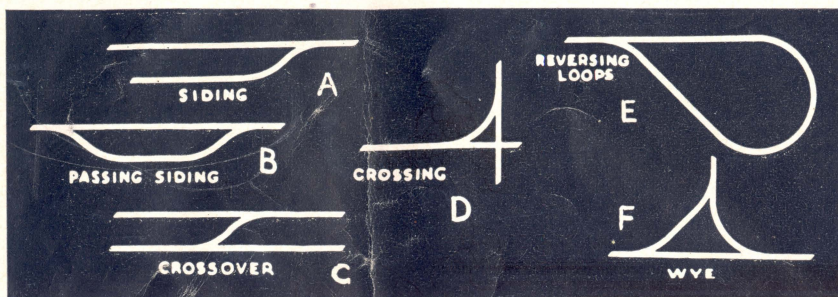


Figure 4.—Overall dimensions: 82" x 41".
Track requirements: 14 sections straight,
10 sections curved, 4 switches, 2 remote
control sections.



These Are Some Simple Devices Used on Model Railroad Track Layouts

ELEVATE YOUR LAYOUT

The ideal location for a permanent layout is on a large table or specially built "run-around" wall shelving. Floor layouts risk the perils of stepped-on track, they are awkward to get at and must be broken up when the floor needs cleaning.

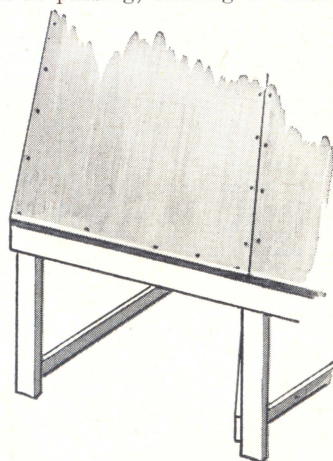
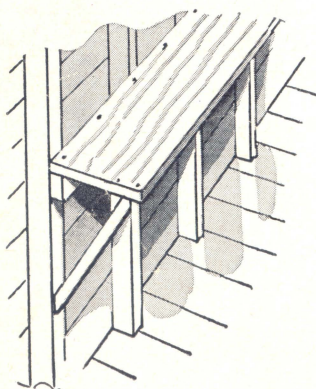
Favorite spots for waist-level train setups are dry cellars, attics, spare rooms and garages. The diagrams below illustrate simple methods of building wall shelving or tables. Platforms can be cheaply constructed of old lumber or second-hand plywood. Plywood has definite advantages in that it requires little cutting or fitting and simplifies drilling of holes for hidden wiring. If you construct a table arrangement be sure that the legs are well cross-braced. Wall shelving, too, should be sturdily built to prevent sway and unsteadiness.

One of the principal reasons for the shelf or table layout is to bring model train operation to a realistic-

view angle. Although there is some dispute as to the correct height from the floor, the general agreement is that 40 inches is about right for adults, a height of about 26 inches for the seven or eight-year-old. For a father-and-son layout it is possible to construct a narrow six-inch step to take care of the junior partner.

MAKE USE OF "MAGNE-TRACTION"

You will undoubtedly want to have some mountainous sections on your layout to make use of the grade-pulling power of your locomotive's "Magne-Traction". Be sure that your high-level roadbeds and overpasses are securely anchored to the platform so that train vibration will not loosen them. One caution: do not start track grades too sharply or the pilot of your locomotive may strike the third rail in passing, causing a "short."



FIVE INTERESTING LAYOUTS

Here are five intriguing layouts that you can shoot for when you start planning your railway system. The setups in Figures 66 and 67 are good examples of how you can begin with simple loops and gradually expand with the addition of switches and sidings. Any one of these layouts, when finished, can handle several trains, and all are planned for both passenger and freight service.

All accessories shown are available at your Lionel dealer, with the exception of the turntable in Figure 69. You can build this turntable yourself from plans furnished by model builder magazines. You will, of course, want to add a number of accessories such as semaphores, block signals, etc.

MAKING ODD-LENGTH TRACK

These drawings give you an idea of the number of track sections, switches, and remote control sections needed. You will note that some layouts call for the use of half-track or odd lengths. Your Lionel dealer can supply you with "O" half-track. To make "027"

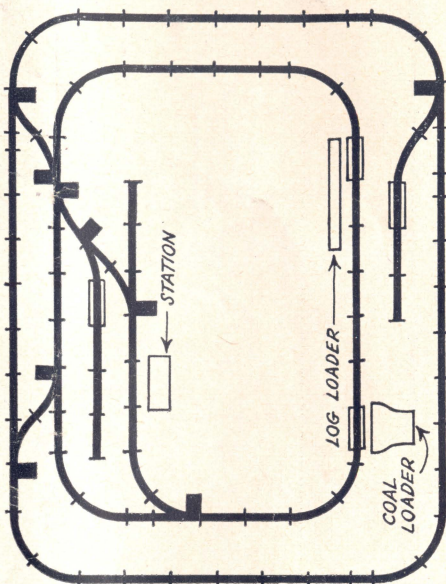


Figure 66

half-sections or odd lengths, track can easily be cut by placing it in a vise and using a hack saw. The layout shown in Figure 66, above, is an excellent road to fit on a large table or an around-the-room layout. It permits simple operations, even though two trains may be run in opposite directions. Space needed: 130" by 110".

The layout illustrated in Figure 67, requires only four switches. Crossing at lower left-hand corner can be accomplished by grading with overpass, giving good opportunity for "Magne-Traction" trains. Space needed: 130" by 100".

EXPANDING YOUR PIKE

In Figure 68, you can start with the entire big loop around the table. Later, you can insert additional sidings, such as the station siding, and the house track where the log-loader is located. The coal-loader siding can be added when convenient, and can be placed almost anywhere on the road. Final addition could be the reversing loop on the bottom. Space needed: 140" by 160".

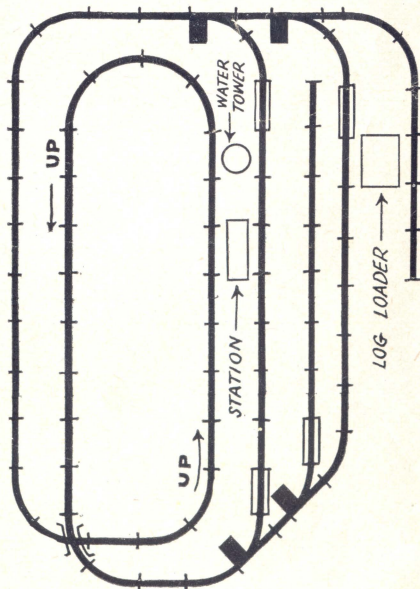


Figure 67

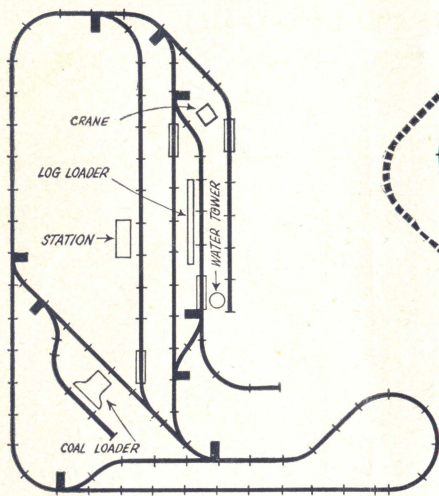


Figure 68

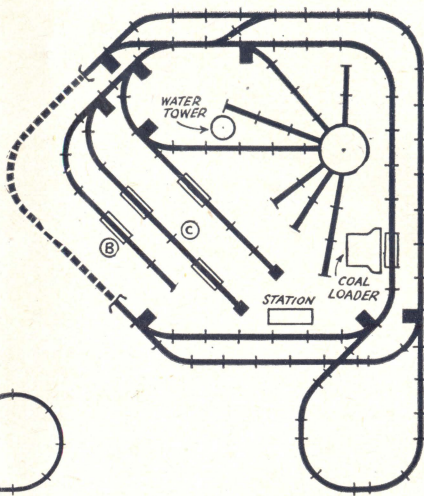


Figure 69

Figure 69 presents the most interesting possibilities for freight handling and future expansion. The three sidings in the center can be graded for "hump" classification yards. The track shown dotted at the left indicates that it is beneath a mountain. Space needed: 140" by 120".

These drawings, except Fig. 67, do not indicate any grading of track beds. This feature has been omitted because grading will be

greatly influenced by the location of your layout. However, as mentioned before, you will definitely want to have varying levels of roadbeds to make full use of the climbing power of your locomotive, equipped with "Magne-Traction".

Figure 70, below, is a double track main line with a crossover A and B on either end and a reversing loop C. Complete yards are in the center and industrial sidings are at point D.

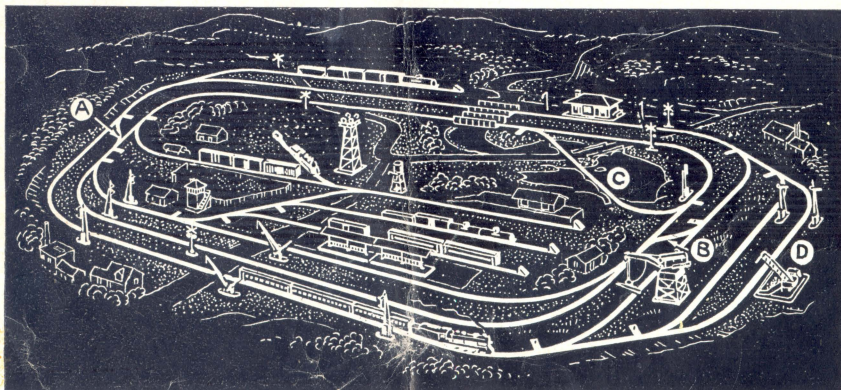


Figure 70

"O" AND "072" LAYOUTS

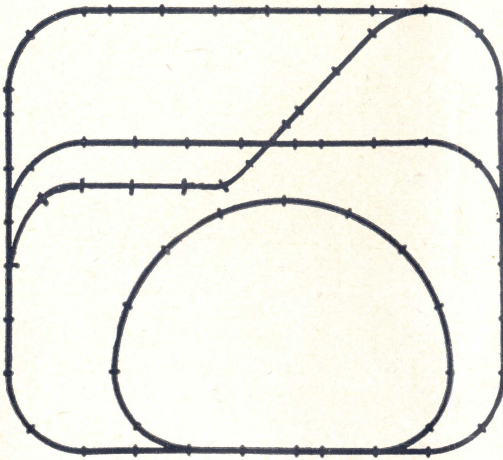


Figure 71 at left shows what can be done by using both "O" and "072" track. You can start with a simple rectangle of "O" track. Inner rectangle with crossover and "072" oval can be added later. Space: 96" x 85".

The return of "072" wide-radius curved track sections is a boon to model railroaders throughout the country. An almost unlimited variety of layouts can be accomplished through the mixture of "O" track and "072" curved sections.

As illustrated in Figure 25 on page 15, "O" and "072" track have the same gauge, *i.e.*, distance between running rails, but an "072" circle measures nearly 74 inches across, while an "O" track circle is only 31 inches.

The wide-radius curves afforded by the use of "072" track add a great deal of realism to model operation by allowing trains to round curves more gracefully at high speeds. It is definitely preferable on curves where a grade is involved. Just as in real-life rail-

roads, the long, slow curve at the bottom of an incline permits the locomotive to pick up traction much more easily.

The "O" track curved section still plays a vital part in the model layout. Its use prevents the layout from spreading out too much. It is usually a better choice for sidings and yards.

Figure 72 (below) shows an interesting combination of the two types of curved track. Layout has two places for reversing the direction of the trains, one in the wye at lower right and the other in the "run-around" in the sidings in the center. Two end loops can later be joined at the top by a long run of straight track. Space: 221" by 74".

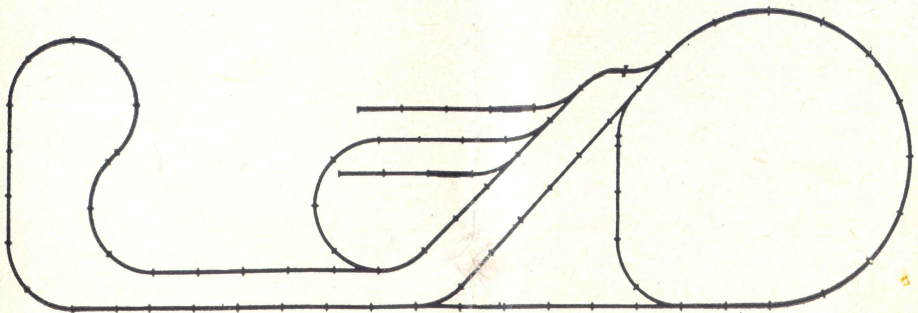
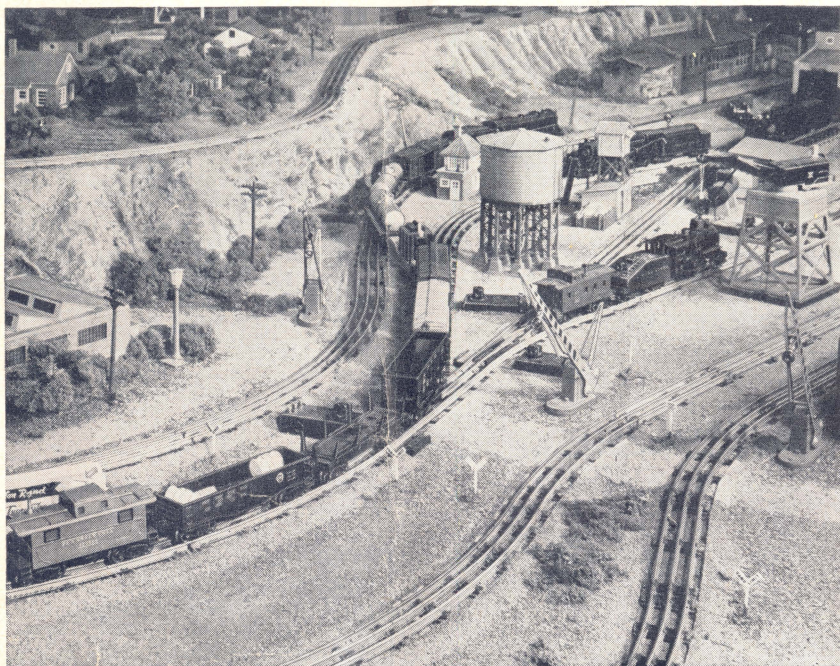


Figure 72

REALISM WITH SCENERY



Grade Shown for Magne-Traction

"Scenery brings it to life." Yes, landscaping is one of the most important parts of building a model pike. General planning of it should take place at the same time you're figuring out your railway system, and some of the actual work must be done before you lay a single section of track. Mountainous areas, rivers, valleys should be in place before track laying is done, so that working on them will not disturb your roadbed. Location of towns will depend on placing of your industrial siding and passenger stations. Keep in mind that you are developing an entire community and countryside. Everything you place in it should have a reason for being where it is.

The basic terrain (hills, valleys, etc.) can be made of wire mesh, molded over wooden supports and covered with papier-mache or plaster. Coloring is entirely up to you and will vary depending on the particular part of the country you want to represent.

Buildings such as houses, factories, churches can be constructed from plans furnished by model magazines, or from kits available at hobby shops. Once you've got the knack of it you can make all kinds of unusual buildings from your own designs.

Most of the landscaping can be done with odds and ends you'll find around the house. Actual stones will provide boulders for your mountainsides, fine sand will make roadways. Dried coffee grounds make cultivated fields, and dirt patches. Trees can be made from wire and steel wool, or pieces of sponge. Some model fans prefer Norwegian Lichen for greenery.

There is one general rule to follow in landscaping your layout—don't hurry. Take plenty of time to make each detail as life-like as possible. You'll find that working on it is as much fun as looking at the completed job. When you're finished, you'll have something to really be proud of.

AUTOMATIC TRAIN OPERATIONS

No matter how little you know about basic electrical principles when you start, you will find yourself becoming more and more familiar with them as your model pike progresses. You will discover that there is no end to the unusual effects you can produce. Some model fans have gone as far as to create thunder storms and the flashing of northern lights in the backgrounds of their layouts.

For instance, you can add a lot of excitement to your train operation through wiring effects such as these two.

At the right (Fig. 73) is a wiring diagram of an automatic railroad on which two opposing trains can run indefinitely, never colliding. The secret, of course, is in letting the trains control each other. On this automatic system, a train emerging from the siding activates the train that has been deadened on the other siding. At the same time it throws switches in the proper manner.

In the operation at the bottom of the page, ground rails on the sidings are insulated so that a train always halts on them. A train at point A will provide a ground circuit through an OSS section and start the train at

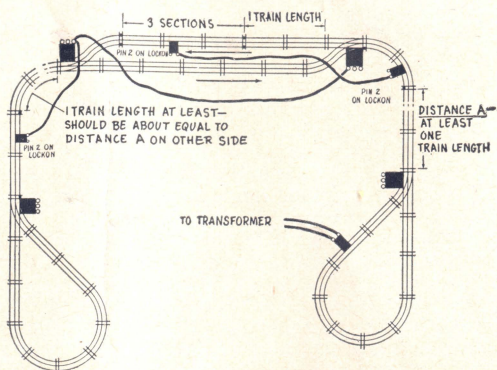


Figure 73

point B. Train A goes into the siding C, and stops. Train B goes on to complete the circuit at point A and start train A again. B takes the siding until A completes the cycle and the whole procedure continues indefinitely.

The switches are wired so that when one is open, its opposite number automatically closes.

The method is simple enough and requires little work. Special insulated "O" track sections, OSS (straight) and OCS (curved), as well as fibre pins are available at your Lionel dealer.

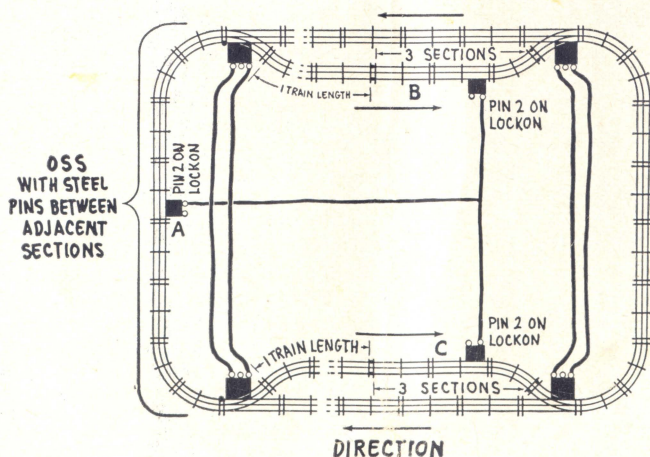


Figure 74

RUNNING A RAILROAD

Most intricate of all model railway systems—and the most exciting of all—is the one that requires the services of a number of operators. Such systems are just the thing for model railroad clubs or for families in which several members all want to participate.

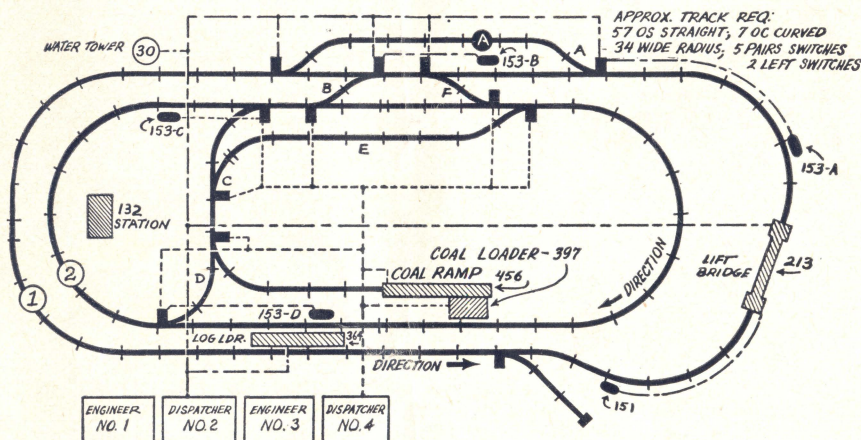
The one shown here is set up for four operators.

The No. 1 man is engineer of the outside loop train, controlling the train only. No. 2 man is dispatcher and operator of the outside loop, controlling switches, signals and any operating accessories. All semaphores, block signals are remote-controlled by dispatcher, so

signal tells him to reduce speed to take switch and pass into siding A. Yellow light on 153B (replacing red light on signal) indicates reduced speed to take crossover B.

When crossover switches at B are set to take trains from outside loop, switch C is also automatically set to take train in on track D. This arrangement reverses train so that it runs in the proper direction on inside loop.

Engineer No. 3 must also follow directions of signals controlled by operator 4. When he is to pass out onto the outside loop, he first backs into track D, then through E, thus reversing direction. Then he



engineer must watch them carefully in the operation of his train.

The inside loop also has both train engineer and dispatcher-yardmaster. No. 3 man runs the inside loop train, while No. 4 controls track operations and accessories.

Now comes the interesting part! Switches and cross-overs permit No. 1 train to move into No. 4's railroad and train No. 3 into No. 2's layout. All operators must be on their toes for such transfers.

Operating this railroad is like this: Engineer No. 1 must watch 151 semaphore for warning of open bridge. A yellow light on 153A

is ready to take crossover F to outside loop.

No. 2 operator controls lift bridge, water tower, lumber loader, switches and all UCS sections on outside loop.

No. 4 operator controls coal loader, coal ramp, all switches and UCS sections on inside loop.

This type of multiple-operator railway system is the closest approximation of real railroading there is, and, limited only by available space, it can be expanded to include six, eight and ten operators. It's a sample of the thrills in store for model railroaders.

PART FOUR

HOW TO TAKE CARE OF LIONEL EQUIPMENT

While complete overhauling and replacement of parts is best done by an Authorized Lionel Repairman, you can do a great deal yourself to keep your trains in good operating order. The most important thing you can do is to clean and lubricate your equipment regularly.

A complete Lubricating and Maintenance Kit No. 927, containing detailed instructions and necessary materials, is available at your Lionel Dealer at \$1.25 and is a good investment for a model railroader.

CLEANING YOUR EQUIPMENT

All parts of your Lionel outfit which serve as electrical contacting surfaces must be kept clean and free of oil or grease which might act as an insulator. These parts are the rolling surfaces of locomotive and car wheels, the contact rollers and sliders and the track itself. Dampen a clean cloth with Lionel Cleaner or other household cleaner, run it over the surface to be cleaned, then wipe dry. If the rails or the rail pins have become rusted, good contacting surface should be restored by polishing with fine sandpaper or steel wool. Loose pins should be tightened with a pair of diagonal pliers as shown in Figure 27. All missing pins should be replaced.

Frequently rails and pins become rust-coated during storage, particularly if they are kept in a damp place. A light coat of lubricant spread on the rails before they are stored away will keep them in good condition and free of rust and dirt.

If you have a smoke locomotive you may find that after some time the locomotive body may become covered with a whitish deposit of condensed smoke material. This coating is easily removed with a little Lionel Lubricant applied with a soft cloth.

To keep your outfit looking new you may want to clean the cars as well. The painted surfaces of car bodies should be cleaned with a cloth saturated with mild soap suds and dried carefully. Do not use any abrasive cleaners and solvents or you will destroy the printed car markings.

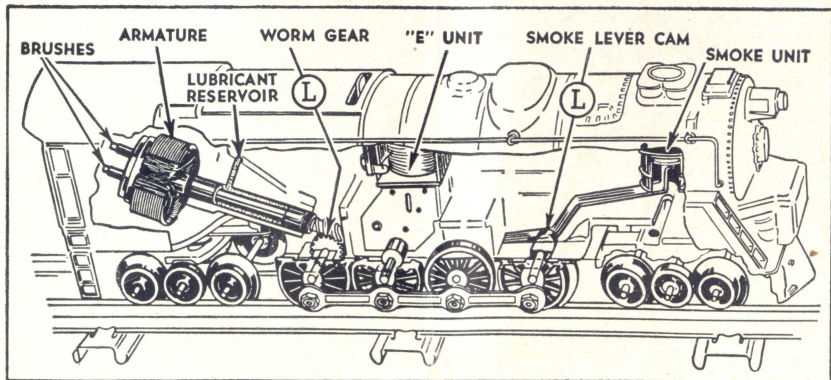


Figure 75—Cutaway View of No. 681 Locomotive Showing Working Parts. Parts Marked "L" Should Be Lubricated Occasionally

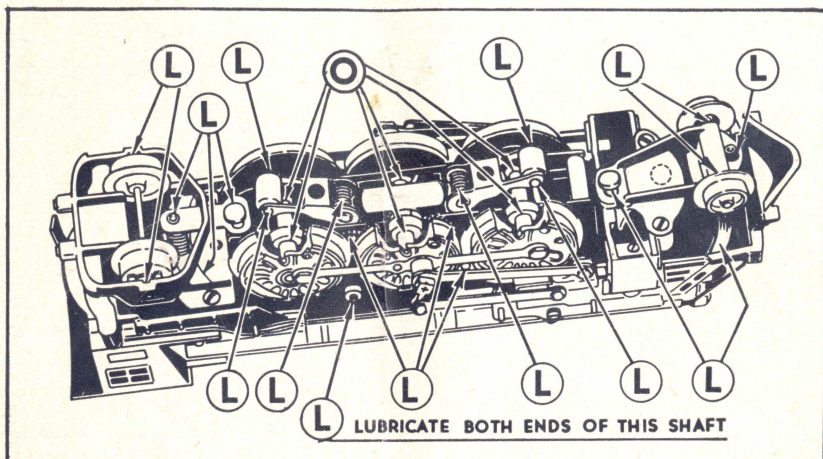


Figure 76—Lubrication Points on No. 2036 Locomotive
Use Oil at Points "O"; Lubricant at "L"

LUBRICATING LIONEL TRAINS

Like all fine mechanical equipment, Lionel Trains should be properly lubricated. This will guarantee good operation and prolong the life of your equipment. Proper lubrication does not mean excessive lubrication. Too much oil or grease is just as bad as none at all, because it will gather dust, foul the motor, and get on the wheels and track making them so slippery that the locomotive will not be able to pull the train. Lubricate thoroughly, but sparingly and wipe off all excess oil or grease.

WHEN TO USE LIONEL LUBRICANT

A tube of special non-fluid Lionel Lubricant is furnished with each Lionel outfit. Because this grease-type lubricant does not run, it should be used for all exposed moving parts of locomotives and cars. Such exposed parts, marked by letter L in the sketches on these pages, include gears, ends of pilot wheel axles, truck pivots and guides and axles of contact rollers and contact brackets. Pay particular attention to the exposed ends of armature shafts in locomotives equipped with transversely mounted motors, such as Nos. 2035, 2036 and 2046. Because these shafts rotate at high rates of speed they require lubrication more frequently than any other part of the locomotive.

Locomotives where the motor is mounted lengthwise do not require as much attention since they are equipped with large lubricant reservoirs which are filled at the Factory. 1950 locomotives containing motors of this type are Nos. 681, 736, 2330 and 2343. Similar motors are used in such accessories as the 364 lumber and 397 coal loaders and 213 lift bridge. A motor equipped with a lubricant reservoir is illustrated in Figure 77. Figure 78 shows the lubricating points of No. 681 locomotive, which is typical of those locomotives where the motor is mounted lengthwise.

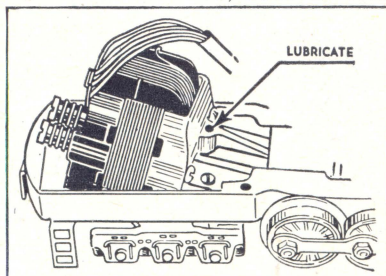


Figure 77—Lubricant Reservoir in
No. 681 Motor

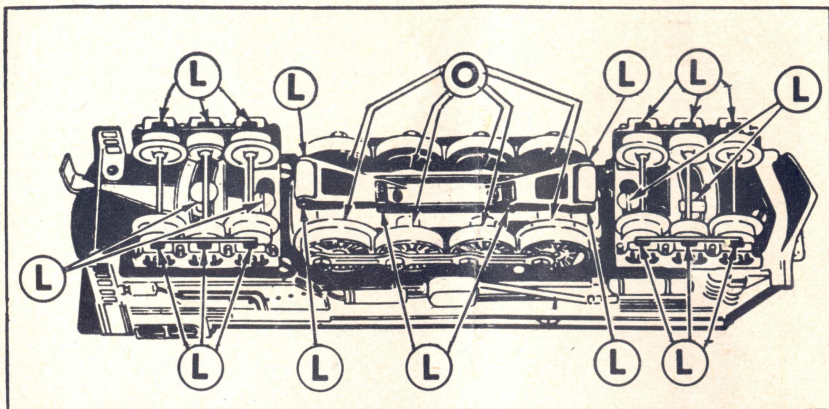


Figure 78—Lubricating Points on No. 681 Locomotive
Use Lubricant at "L"; Oil at "O"

WHEN TO USE OIL

The driving axles of Lionel locomotives run in porous bronze bushings which are impregnated with oil at the Factory and retain their self-lubricating properties for a long time. This self-contained oil supply can be replenished with a few drops of light motor oil. Oil is also used to replenish oil wicks such as are used to lubricate the armature shafts in the whistle motor and in locomotives No. 622 and 2023. Figure 80 illustrates the type of motor using an oil wick for lubrication.

In applying oil be careful not to get any into the brush wells which adjoin the oil hole. To avoid excessive use of oil, and to direct it only at the desired location, the oil should be applied a drop at a time, using a pin or a long wire as applicator.

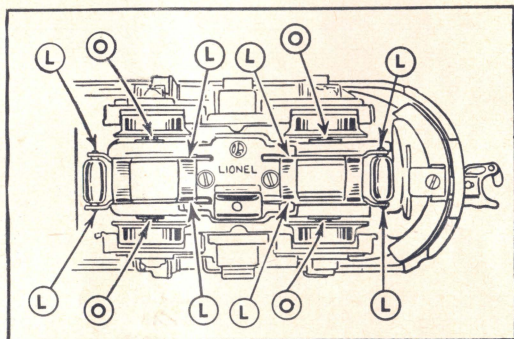


Figure 79—Lubrication Points of a Diesel Locomotive Truck

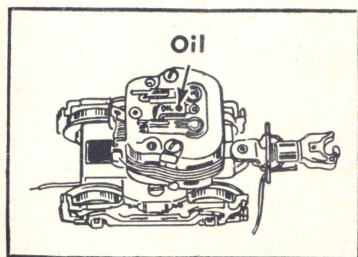


Figure 80—Motor Using an Oil Wick for Lubrication

THE TRAIN WHISTLE

The train whistle is located in the coal tender and can be reached by taking off the body of the tender. The whistle consists of a relay, a whistle chamber, and the whistle motor. The motor is similar to other Lionel motors and is cleaned in the same way, although the brush plate must be removed to reach the commutator. The oil wick which lubricates the armature shaft of this motor is contained in a long housing on top of the brush plate. The wick may be taken out, dipped in oil, and excess squeezed out.

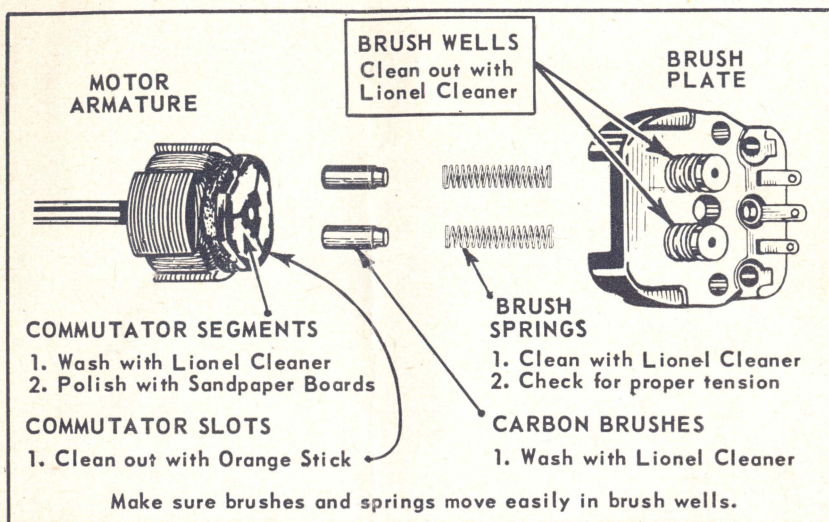


Figure 81—Parts of a Typical Lionel Motor

HOW TO CLEAN MOTORS

Sluggish and uneven operation of the locomotive is most often caused by a dirty motor. A typical Lionel motor consists of parts illustrated in Figure 81. Although these parts may vary somewhat in shape and arrangement they can be easily recognized and are cleaned in the same way. The most important part to be cleaned is the *commutator*, the segmented copper surface on which the carbon *brushes* make their contact. The commutator can be easily seen and reached for cleaning on locomotives having a transversely-mounted motor. To polish the commutator face turn the locomotive on its side and connect one wire from transformer to the locomotive contact roller and the other wire to any metal part of the locomotive body. The motor will then run. While it is running press a small piece of very fine sandpaper against the moving commutator. Then clean out the commutator slots with an orange stick, toothpick, or similar pointed wood instrument.

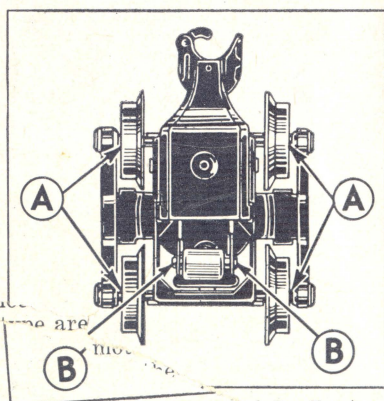


Figure 82—Underside of Car Truck.
Lubricate Axle Bearings (A) and Roller Bearings (B)

In locomotives where the motor is mounted lengthwise, the motor can be reached only after the locomotive body is removed. In many of them the commutator can be reached through a hole in the brush plate.

LUBRICATING CAR TRUCKS

Improperly lubricated car trucks may double the drag on your locomotive. Spin the wheels by hand. If they show any signs of drag or binding remove the old lubricant and the accumulated dust and dirt with Lionel Cleaner and apply a dab of fresh lubricant at points A. If the truck is equipped with a contact roller, apply lubricant at the roller axles as well (Points B). Unless this is done the axles will eventually grind through the contact brackets.

"Clean and Lubricate Your Equipment"

REPLACING HEADLIGHT LAMPS

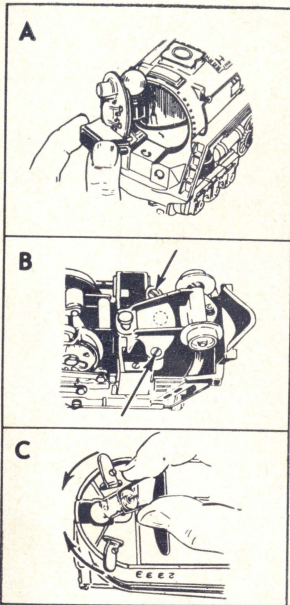


Fig. 83—Replacing Lamps

If the bulb in the locomotive headlights or in an illuminated accessory does not light, first check to see that the bulb is tight in its socket. If the lamp is burned out you can easily replace it yourself by obtaining a spare from your dealer. The chart on the inside of the back cover lists replacement lamps for all modern Lionel equipment.

To reach the head lamps of 1950 Lionel locomotives follow the directions below:

622	Remove cab by inserting a screwdriver in the slots on the bottom and turning them as indicated.
681	Pull out boiler front (Fig. 83A).
736	Open hinged boiler front.
773	Open hinged boiler front.
2023	Remove locomotive body.
2035	Pull out boiler front (Fig. 83A).
2036	Unscrew front truck bracket (Fig. 83B).
2046	Take out small screw in front of smokestack, then pull out boiler front.
2330	Lift out lamp bracket as shown in Fig. 83C.
2343	Take off body by removing three screws. (See Fig. 11).
2344	

REPLACING HORN DRY CELLS

The remote control horns which are contained in Lionel Diesel and Electric Locomotives are powered by a flashlight dry cell which is inserted into the locomotive through an opening in its base. (See Figure 11). These cells will last a long time but eventually lose their power, even if they are not used.

These flashlight cells can be replaced by any standard size "D" cell, available in your hardware store, 5-and-10-cent store, etc. If the locomotive is stored away for a long time its a good idea to remove the cell, for it will lose its power during storage in any case.

In 2330 Locomotive the dry cell is reached by removing end truck and lifting out floor panel. The panel is held by two catches shown by arrows in Figure 83C.

FINDING SHORT CIRCUITS

A short circuit is a direct connection between the two output terminals of the transformer or between the center rail and one of the outside rails. It causes an excessive current to be drawn from the transformer so that the transformer circuit breaker keeps on opening and closing. The short circuit may be caused by a piece of metal or wire accidentally joining the center and the outside track rails, or by broken insulation between the center rail and the metal cross-ties.

If you have trouble in discovering the cause of a short circuit proceed as follows. Remove the train and all other equipment from the track and make sure that a piece of metal or Christmas tree tinsel is not touching the rails. See that all sections of track fit tightly. Then connect one wire from transformer to an outside rail and brush the end of the other transformer wire across the center rail. If the track is perfectly insulated no sparking will occur at the place where the wire touches the rail, but if it is short-circuited, sparks will appear.

To locate the short-circuited section, disconnect one section of track at a time and apply the wires to the remaining sections as explained above. When the defective section is removed, the sparking will stop.

MOTOR TROUBLE SHOOTING

If your train refuses to run, first make sure that the transformer is plugged in and that you are getting current from the transformer output terminals. Then see that all connections on transformers and track are correct and firmly fastened. See that there are three steel pins inserted at the end of each section of track.

If train still does not run, disconnect the two transformer wires from track. Prop locomotive right side up so that wheels are free to turn. Touch one of these wires to any unpainted part of the motor frame. With the other wire touch the contact shoe which collects the current from the center rail of the track. If motor still does not operate, it may be that the reversing unit is in neutral position. If the E-Unit is in neutral position, the locomotive will not run, although the locomotive headlights will be on. Try the above procedure with different adjustments of the reversing unit lever.

If the wheels move very slowly, cleaning and lubricating the motor may be all that is necessary to restore original power.

If motor starts and stops, or if wheels do not revolve, look for loose connections. See if the carbon brushes make good contact with commutator. Clean the commutator as described in a previous section.

If the wheels revolve freely there is nothing wrong with the locomotive motor. The trouble may be that the contact shoe rollers do not have enough tension to make proper contact with the center rail. If contact rollers appear to be badly worn, have them replaced at the nearest Service Station.

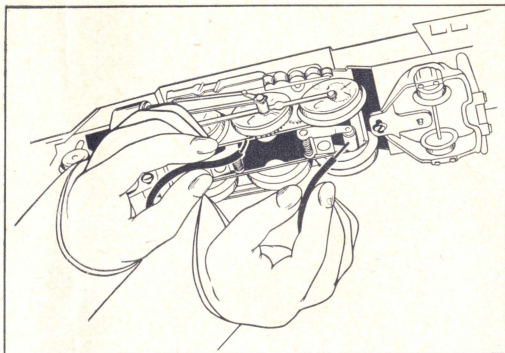


Figure 84.—How to Test Locomotive Motor.
Locomotive Should Be Erect

LIONEL SERVICE STATIONS

AUGUST 1

JULY 31

1950 - 1951

factory
seal of
approval



LIONEL Products are guaranteed against defects in material and workmanship to the extent that if any such defective article is returned to the Lionel Service Department or to any Lionel Authorized Service Station within a year of the date of purchase it will be repaired or replaced.

If any of your equipment needs servicing you may send it either to the Factory Service Department or to any Lionel Approved Service Station.

Although the Lionel Approved Service Stations listed in the following pages are independently

owned and operated, each has been carefully checked by The Lionel Corporation for reliability. These Service Men are experts and most of them have been adjusting and repairing Lionel equipment for many years. Lionel Authorized Service Station approval is not permanent but has to be renewed from year to year to assure continuing high standard of service.

In addition, The Lionel Corporation maintains two large Service Stations of its own. One is at 15 East 26th Street, New York 10, New York, and the other is at 1460 Chestnut Avenue, Hillside 5, New Jersey.

The Lionel Corporation assumes no responsibility, financial or otherwise, for material left or work done by privately-owned Lionel Approved Service Stations. Any complaints brought to our attention will be quickly investigated.

For good operation of your equipment, at all times,
please read the instruction booklet carefully.

When returning articles to service either to the Lionel Service Department or to any authorized Service Station, please send only those articles which you believe to be inoperative. There is no need to return the complete outfit when the trouble is in the locomotive only.

THE LIONEL CORPORATION — SERVICE DEPARTMENT
1460 CHESTNUT AVENUE HILLSIDE 5, NEW JERSEY

LIONEL APPROVED SERVICE STATIONS

ALABAMA

BIRMINGHAM
DOTHAN
MONTGOMERY

Stewart's Sport Shop, 3 No. 19th Street
Poyner Seed Co., 129-131 N. St. Andrews St.
Pake-Stephenson, Inc., 14 Commerce Street

ARIZONA

PHOENIX

Lionel Train Hospital, 2833 N. 16th Street

ARKANSAS

LITTLE ROCK

555 Incorporated, Third and Broadway
Parsel's, 316 West Capitol Avenue

CALIFORNIA

ALHAMBRA
BAKERSFIELD
CARMEL
FRESNO
HOLLYWOOD
INGLEWOOD
KINGSBURG
LONG BEACH
LOS ANGELES

W. L. Moore, 308 So. 2nd Street
The Stamp and Coin Shop, 1414 20th Street
Douglas Kay, Inc. Toys & Sporting Goods, Lincoln Avenue
Arthur's Toy & Baby Shop, 911-915 Broadway
Hollywood Hobby & Electric Shop, 1522 Cahuenga Blvd.
The Hobby House, 610 E. Manchester Blvd.
Olson Bros., 1530 Marion Street
Ray's Hobby Model Supply, 1222 American Avenue
Colonel Bob's, 3707½-3709 West Pico Blvd.
J. R. Metz, 1753 West 21st Street
Train Repairs, 5406½ Lemon Grove
Troxel Bros. Models, 202 So. Western Avenue
Jack Collier's "Toys for Men", 3669 Grand Avenue
Lee's Train Service, 3980 Piedmont Ave.—Phone: Piedmont 5-7877
Palo Alto Sport Shop, 526-30-34 Waverley St.—Phone: DA 3-4316
Garstang's Trains & Toys, 87 E. Colorado Street
Toytown, 1512 Valley Blvd.
H. Cameron, Jr., 609 Jay Street
H. K. Vance, Train Repairs, 2538 5th Avenue
Frank "The Trainman", 4310 Park Blvd.
G. F. Harbin Company, 209 W. Bonita Avenue
California Electric Service, Inc., 168 First Street
Jack Collier's "Toys for Men", 693 14th Street
The Engine House, 480 Pacific Street
Jack Smith Toys & Bicycles, 1927 El Camino Real—Phone: Fireside 5-1215

OAKLAND

PALO ALTO
PASADENA
ROSEMEAD
SACRAMENTO

SAN DIEGO
SAN DIMAS
SAN FRANCISCO

SAN LUIS OBISPO
SAN MATEO

COLORADO

COLORADO SPRINGS
DENVER

Earl Udick Service, 115 No. Nevada Avenue
Dire's Repair Service, 1104 18th Street
Fisher Hardware Company, 2322 E. Colfax Avenue

CONNECTICUT

BRIDGEPORT

BRISTOL
GREENWICH
HARTFORD
MIDDLETOWN
NEW HAVEN

NEW LONDON
STAMFORD
WATERBURY

Blinn's, 64 Cannon Street
Senior's, Inc., 1200 Broad Street
Train Exchange Center, Inc., 631 Fairfield Avenue
Hobby Center, 96 No. Main Street
Halberts Linoleum Arts, 100 Greenwich Avenue
Marholin's, Inc., 1177 Main Street
Amato's Hobby Center, 600 Main Street
Hull's Hobbies, 1203 Chapel Street—Phone: 8-4319
Parmele & Sturges, Inc., 51 Crown Street
The G. M. Williams Company, 47-55 State Street
Max K. Trell, Inc., 497 Main Street
Harry's Super Store, 400-408 So. Main Street

DELAWARE

WILMINGTON

Knowles Model & Music Shop, 515 Shipley Street
Schweizer Repair Shops, 525 W. Front Street

LIONEL APPROVED SERVICE STATIONS

DISTRICT OF COLUMBIA

WASHINGTON

Corr's Nation's Hobby Supply, 812 Ninth Street, N.W.
 Carl W. Dauber & Sons, 2320 18th Street, N.W.
 General Electronics, 4513 Wisconsin Avenue, N.W.
 Spring Valley Electric Shop, 4805 Massachusetts Avenue
 Superior Lock & Electric Co., 1410 "L" Street, N.W.

FLORIDA

FORT LAUDERDALE

Hobby House, 33 S.E. 2nd Street

JACKSONVILLE

Harold Ashley Company, 1636 Hendricks Avenue
 Frank Whipple's Model Sales & Service, 2817 Main St.—Phone: 6-5778

MIAMI

The Hobby Center, Inc., 3621-23 S.W. 8th Street
 Geo. E. Wintz Toys, 150 N.E. 1st Street
 Wintz Toy Shops, 7933 N.E. 2nd Avenue (Little River)
 Wintz Toy Shops, 2225 Collins Avenue

MIAMI BEACH

Toyland, Inc., 705 North Orange Avenue

ORLANDO

W. R. Lancaster & Son, 827 Central Avenue

ST. PETERSBURG

Columbia Music & Appliance Co., 1427 E. Broadway

TAMPA

Tampa Photo Supply Co., 510 Tampa Street

GEORGIA

ATLANTA

Buckhead Hobby Shop, 3141 Roswell Road, N.E.

Walco Sporting Goods Co., 41 Pryor Street, N.E.

AUGUSTA

Rex Hardware Company, 1128-30 Broad Street

COLUMBUS

Bentley's Sport Shop, 1303-05 Broadway

DECATUR

Clark Equipment Co., 111 Sycamore Street

SAVANNAH

The Hobby Shop, 254 Bull Street

IDAHO

BOISE

Fred Stivers Model Railroad Shop, 1315 Hays Street

ILLINOIS

AURORA

May Electric Appliance, 61 Fox Street

BELLEVILLE

Harter's Hobby House, 1011 W. Main Street

BERWYN

Golddeck Model Airplanes & Hobby Shop, 2615 So. Ridgeland Avenue

BLOOMINGTON

Harry's Hobby House, 102 E. Market Street

CHAMPAIGN

Paul Lauterborn's Appliance Supply Shop, 117 No. Walnut St.

CHICAGO

A-Abart Electric Co., 506 N. Milwaukee Ave.—Phone: Taylor 9-5555

Ahern's Cycle Shop, 4540 W. 63rd Street—Phone: Po 7-8154

Arnold Bonse's Hobby Shop, 10210 So. Emerald Ave.—Phone: Ced. 3-4934

Ben's Hobby Shop, 72 W. Washington St.—Phone: Financial 6-0827

C. & I. Hobby Center, 3249 W. 63rd Street.—Phone: Grovehill 6-5117

E. & G. Model Hobby Shop, 4121 W. 26th St.—Phone: Crawford 7-4268

Gross Radio & Electric Shop, 6767 Stony Island Avenue

Kenmac Radio Center, Inc., 6348 N. Western Avenue

Phone: Rogers Park 1-0500-01-02

Leader Model Supply Company, 6539 S. Ashland Avenue

Mack Brothers, 2041-7 W. Chicago Ave.—Phone: Taylor 9-3400

O. R. Martin Company, 916 Belmont Avenue

Northwest Model Shop, 5037 Irving Park Blvd.

Steve's Hobby Center, 103 E. 111th Street—Phone: Co 4-8725

West Towns Hobby Shop, 5808 W. Chicago Ave.

CHICAGO HEIGHTS

Towne Stores, Inc., 52 E. 16th Street

CONGRESS PARK

Raby's Sporting Goods & Bicycles, 4170 Richmond Ave.

DANVILLE

Electric Trains Sales & Service, 109 S. Gilbert St.—Phone: 8928

DECATUR

Hobby House, Inc., 110 E. William Street

EVANSTON

Noren Cycle Shop, 2805 Central Street

HARVEY

Macander Radio & Electric, 15710 S. Halsted Street

LA GRANGE

La Grange Hobby Center, 124 W. Burlington Avenue

MOLINE

The Train Shop, 1832 4th Street

OAK PARK

Realistic Models, 725 South Boulevard

PEORIA

J. V. Harrison Electric Company, 416 Sterling Avenue

Hobbymodels, 327 So. Washington Avenue

ROCKFORD

Hedrick Electric Company, 201 7th Street

Swanson Electric Appliance Repair, 226 Ogden Avenue

LIONEL APPROVED SERVICE STATIONS

ILLINOIS (Continued)

URBANA
WAUKEGAN
WINNETKA

Lorry's Sports-Hobby's, 206 W. Main Street
Hyde Electric Shop, 1409 Washington Street
Fix-It Shop of Winnetka, 552 Green Bay Road

INDIANA

BRIDGEPORT
EVANSVILLE
FORT WAYNE

Caboose Train Shop, West National Road
Automotive Electric Service, Inc., 300 Ingle St.—Phone: 5-8032
Ralph H. Calvert, Union Central Lines, 1132 Wabash Avenue
Phone: Eastbrook 5204
Krull's Tire & Sporting Goods Store, 414 E. Washington

GARY
INDIANAPOLIS

Brams Toy & Hobby Shop, 4484 Broadway
Broad Ripple Hobby Supply, 929 E. Westfield Blvd.—Phone: BR. 7492
Les' Repair Service, 1724 Central Ave. (rear)—Phone: Highland 8925
Bob Steele's Hobby Center, 3324 E. 10th St.—Phone: Atlantic 6411
Lafayette Model Supply, 805-809 S. 26th Street
C. B. Kirk Company, 117 E. Main Street
Jim's Repair, 822 So. 11th Street
Grose's Bike Shop, 226-228 W. Washington

LAFAYETTE
MUNCIE
RICHMOND
SOUTH BEND

IOWA

CLINTON
DES MOINES
DUBUQUE
SIOUX CITY

Handy Repair Service & Hobby, 1913 No. 2nd Street
Iowa Service Company, 12th and Mulberry
Pohl's Radio & Electric Train Repair Service, 1810 Lincoln Avenue
K. & K. Radio Service & Hobby House, 1209 Pierce Street

KANSAS

BELOIT
LAWRENCE
TOPEKA
WICHITA
WINFIELD

Gus' Hobby Shop (& or) Electric Appliance Co., 110 E. Main
Scott Temperature Equipment Co., 729 New Hampshire St.—Phone: 326
Martin's Hobby Shop, 2401 Sardou Avenue
Train Service Company, 5421 E. Kellogg Avenue
Enterprise Sales Company, 812 Main Street

KENTUCKY

BUECHEL
LOUISVILLE
ST. MATTHEWS

Buechel Electric Service, Fegenbush Lane
Fischer's Hobby Service, 618 S. 4th Street
Kentucky Model Shop, 3805 Wilmington at Wallace

LOUISIANA

BATON ROUGE
NEW ORLEANS

Pelican Model Shop, 2815 Main Street
St. Claude Hardware & Paint Store, 4208-10 St. Claude Avenue
C. G. Staubitz Company, Inc., 3604 So. Carrollton Avenue
C. G. Staubitz Company, Inc., 4334 St Charles Avenue
Standard Furniture & Hardware Company, 135 E 70th Street

SHREVEPORT

MAINE

BANGOR
LEWISTON
PORTLAND

Cal's Electrical Shop, 22 Hammond Street
The Merrill Laboratory, 204 Lisbon Street
Parker L. Starrett, 165 High Street

MARYLAND

BALTIMORE

The Electric Motor Repair Company, 340 Fallsaway
French's, Inc., 304 West Baltimore Street
Govans Hardware, 5007 York Road
W. S. Lloyd & Son, 2117 N. Charles Street
Pospisil's Service Station, 8030 Eastern Avenue
Louis J. Smith, 510-12-14 So. Conkling Street
The Spot Hobby Shop, 304 Park Avenue

CUMBERLAND

The Hobby Shop, 55 North Centre Street
Lee's Hobby Shop, 228-230 N. Centre Street

FREDERICK
HYATTSVILLE

Bartgis & Zimmerman, Inc., 30-36 East Patrick Street
Hawkins Electric Company, Inc., 5604 Rhode Island Avenue

LIONEL APPROVED SERVICE STATIONS

MARYLAND (Continued)

ROCKVILLE
SALISBURY

Hitt's Electrical Service, 211 East Montgomery Avenue
Howard's Electrical Repair & Hobby Shop, 617 Truitt Street

MASSACHUSETTS

BOSTON

BROCKTON
BROOKLINE
CONCORD
EAST DEDHAM
FALL RIVER
LOWELL
LYNN

Boston Model Railroad Company, 665 Atlantic Avenue
Eric Fuchs Model Railroads, 26 Tremont Street
Brockton Hobby Shop, 67 East Elm Street
Beacon Train & Toy Shop, 1378B Beacon Street
Ralph A. Macone Sporting Goods, 27 Walden Street
Seale's Service Shop, 39 High Street
Ashton's Sporting Goods, 35 Borden Street
Henry Poirier, Inc., 636-646 Merrimack Street
John C. Coggin, 32 Beacon Hill Avenue
Fuller Electric Company, 73 Summer Street
Trilor's, State and Reed Roads
O. F. Springer Jr. & Company, 339 Bay Street
Henry's Hobby House, 37 Trumbull Street
Sandberg Supply Company, 37-43 Mechanic Street

NORTH DARTMOUTH
SPRINGFIELD
WORCHESTER

MICHIGAN

DETROIT

Baker & Baker, 11708-10-12 Chalmers Ave. Phone: Lakeview 6-3800-01
Jack Davis Hobbies, 15146 Grand River
Downtown Train & Camera Shop, 122 W. Elizabeth. Phone: Wo 1-6932
Hiram Marks Electric Co., 601 E. Congress St. Phone: Woodward 1-5553
The Train Clinic, 13950 Hubbell Ave. Phone: Vermont 7-6430
Vaughan's Radio & Train Shop, 15434 Harper Ave. Phone: La 7-0771

ESCANABA
FLINT
GRAND RAPIDS
GROSSE POINT
JACKSON
KALAMAZOO
LANSING
MUSKEGON
PONTIAC
PORT HURON
ROYAL OAK

The Kiddie Korner, 923 Ludington Street
Evinrude-Elto Flint Sales, 2101 So. Saginaw Street
C. A. Meyers & Company, 16 W. Fulton Street
Judy's Gift Shop, 1179 Harvard
Model Railroad Specialty Company, 1915 E. Michigan Avenue
M. Howard Gideon Company, 925 So. Burdick Street
The Hobby Hub, 12-A Michigan Theatre Arcade
C. Karel & Sons, 936-38 Pine Street
Tasker's, 63 West Huron
Hank Schneider, 708 Huron Avenue
Dunn's Hobby Arcade, 610 S. Washington

MINNESOTA

DULUTH
MANKATO
MINNEAPOLIS

Martin Carr "Train Doctor", 1911 W. Superior St. Phone: Mel 7129
Joseph Manderfeld Company, 509 So. Front Street
Children's Shop, 1013 4th Avenue South
Ken Dean's Train Repair Shop, 611 2nd St. N.E.—Phone: Ge 6825
Warner Hardware Company, 13 So. 6th Street
Woodcraft Hobby & Archery Store, 903 W. Lake St. at Bryant Ave.
Phone: Hiawatha 1718

ROCHESTER
ST. PAUL

Westphal's Trick & Novelty Shop, 1115 Second St. S.W.
Cal's Twin City Hobby Shop, 593 N. Snelling. Phone: Mi 8998
Marien Appliance Co., 1684 Grand Avenue
Uptown Music & Hobby Shoppe, 357 Robert Street. Phone: Ce 6079
Woodcraft Hobby & Archery Store, 374 Robert St. Phone: Cedar 0147
Fayette O. Ehle Radio-Bicycle Service, 162 E. 3rd Street

WINONA

MISSISSIPPI

JACKSON

Nelson's, Inc., 125 So. Lamar Street

MISSOURI

CLAYTON
FERGUSON
KANSAS CITY

The Playroom, 7730 Forsythe Blvd.
A. G. Freihoff, 26 Compton Ave.—Phone: Victor 7-3744
Baird-Whitmer, 431 Alameda Road
Siebers Brothers Models, 404 Westport Road
Sterling Tire & Supply Company, 600 E. 31st Street

LIONEL APPROVED SERVICE STATIONS

MISSOURI (Continued)

SPRINGFIELD
ST. JOSEPH
ST. LOUIS

Ozark Mountain Railroad, 950 West Commercial Street
Economy Oil Company, 8th and Monterey Streets
Bell Radio & Appliance Company, 6190 Delmar
Brandt Electric Company, 904 Pine Street
Johnston Electric Train Company, 3118 Chippewa Street
Mundell Appliance Service Company, 6363 Easton Avenue
Phone: Goodfellow 1100

WEBSTER GROVES

Hulett's Appliances, 18 W. Big Bend Road

MONTANA

BUTTE

Philips Repair Shop, 2226 Silver Bow Street

NEBRASKA

LINCOLN
OMAHA

Steve's Railroad Yard, 1841 Garfield
Cappy's Sporting Goods, 215 No. 16th Street
Benjamin W. Hicks, 2758 Sharon Drive—Phone: Kenwood 1244
E. A. Wight, 4222 Dodge Street

NEVADA

RENO

Builders & Farmers Hardware Company, 1274 So. Virginia Street

NEW HAMPSHIRE

CONCORD
MANCHESTER

French's Radio Shop, 10 No. State Street
Coughlin's, 18 Hanover Street

NEW JERSEY

ASBURY PARK
ATLANTIC CITY
BAYONNE
BEDMINSTER
CAMDEN
DUNELLEN
EAST ORANGE
ELIZABETH
GARFIELD
HOBOKEN
IRVINGTON
JERSEY CITY
LINDEN
MILLBURN
NEW BRUNSWICK
PATERSON
PERTH AMBOY
PHILLIPSBURG
RIDGEWOOD
TRENTON
WESTFIELD

Train Headquarters, 639 Mattison Ave.—Phone: Asbury Park 2-2092
and Deol 7-8525W
M. R. Hall & Son, 3939 Ventnor Avenue—Phone: 2-4166
Dobb's Service Station, 720 Broadway—Phone: BA 3-4310-11
North Jersey Train Center, Route 32
Denver's Hobby Shop, 312 Federal Street
Federal Hobby Shop, 28th and Federal Streets
Model Railroad Shop, Corner Vail Avenue and N. M. Road
Briteway Electric Service, 959 So. Orange Ave.—Phone: OR 5-9538
Hobby Depot, Inc., 274 No. Broad Street—Phone: EL 2-7039
Treasure House-Lionel Train Center, 27 Passaic St.—Phone: PR 7-4331
Ben Cowan & Bro. Electric Shop, 201 Washington Street
Kraft Hardware, 746 Springfield Avenue
Madison Cycle Company, 1288 Springfield Avenue
Tony Statile's House Bazaar, 309 Central Ave.—Phone: JO 3-9392
Uneeda Appliance Company, 2973 Boulevard—Phone: JO 5-1660
Rosewood Hobby Shop, 115 N. Wood Avenue—Phone: LI 2-4413
Millburn Train Center, 391 Millburn Ave.—Phone: MI 6-4247
Steve Varga's Hobby Shop, 57 Easton Avenue
Neil Hardware, 449 E. 18th St.—Phone: SH 2-6349
Spivak Bros., 42 Main St.—Phone: Sherwood 2-1516
Fishkin Bros., Inc., 157 Smith Street
Keith Willever & Sons, 314 So. Main Street
F.I.A.T., Inc., 19 West Ridgewood Ave.—Phone: RI 6-3030
Ardmore Electric Shop, 916 Hamilton Avenue
Terry Town Toys, 159 E. Front Street
Central Jersey Models, Corner North and Lenox Avenues

NEW MEXICO

ALBUQUERQUE

Denton, 503 So. 10th Street

NEW YORK STATE

ALBANY
AMSTERDAM
BATAVIA

Charles Klarsfeld, 67 Hudson Avenue
The Radio Workshop, 285 W. Main Street
Dobsons Train Hospital, 213 W. Main Street

LIONEL APPROVED SERVICE STATIONS

NEW YORK STATE (Continued)

BINGHAMTON	Hullman Bedding Co., 110 Court Street Kern's Hobbies, 2 Court Street Speed Queen Appliance Company, 60 Exchange Street
BUFFALO	Marty Jones, 240 Forest Avenue Chester I. Spoonley, 37 Choate Ave.—Phone: Triangle 3908 E. S. Waggoner, 1380 Jefferson Avenue
ELMIRA	Bunis Books, Toys and Hobbies, 142 E. Water Street
GENEVA	Seneca Cycle & Toy Co., Inc., 100 Seneca Street
ITHACA	Powers' Instrument Shop, Buttermilk Falls, R.F.D. No. 5—Phone: 31525
JAMESTOWN	Model Railroad Laboratories, Box 72
MT. VERNON	Telly Electric Supply, 116 Gramatan Ave.—Phone: MO 8-0750
NEW ROCHELLE	Jack & Jill Wonderland, 322 Webster Ave.—Phone: N.R. 2-5898 Lusus & Sons, 255 Huguenot Street
PLATTSBURG	Hobby Hanger, 36 Clinton Street
POUGHKEEPSIE	Len Melhado's, 511 Main Street
ROCHESTER	E. A. Gardner, "The Train Doctor", 2261 Dewey Ave—Greenwood 2847 Kanzler Electric Co., 180 Normandy Avenue Lake Ave. Hobby & Craft Shop, Inc., 583 Lake Ave. Cor. Ravine Ave. Henry's Cycle Shop, 888-90 Albany Street
SCHENECTADY	Reliable Appliance Shop, 92 Lafayette Avenue
SUFFERN	Ed Guth Hobbies, 132 East Genesee Street
SYRACUSE	Jack's Hardware, 1906 South Ave.—Phone: 5-0820 Sperry Craft Shoppe, 107-109 W. Taylor Street
TROY	French's Model Shop, 20 State Street
UTICA	Cornhill Hobby Shop, 336 James Street Authorized Service Co., 602 Bleecker Street
WHITE PLAINS	Westchester Train & Toy Co., Inc., 4A So. Lexington Ave.
YONKERS	Yonkers Hobbies & Sporting Goods, 444 So. Broadway Phone: YO 5-6895

LONG ISLAND

AMITYVILLE	Amityville Hardware, 212 Broadway
BELLEROSE	Bellerose Hobby Center, 247-03 Jamaica Ave.—Phone: Fieldstone 7-2513
CEDARHURST	Stanlen, Inc., 566 Central Avenue
FAR ROCKAWAY	Neveloff's, 1024 Central Avenue
FLUSHING	Pleasure Mart, Inc., 161-27 Crocheron Avenue
FRANKLIN SUARE	Franklin Camera & Hobby Shop, 50 Franklin Avenue
GREAT NECK	Village Toy Mart, 697 Middle Neck Road
HEMPSTEAD	H. Blumberg & Sons, Inc., 278 Front Street
HUNTINGTON	Huntington Auto & Electric Parts, 215 Main Street
JAMAICA	S. Bellitte & Sons, 169-20 Jamaica Ave.—Phone REpublic 9-3795
PATCHOGUE	Modern Handicraft Shop, 156 West Main Street
RIDGEWOOD	Nagengast Hardware, 6802 Fresh Pond Road
WOODHAVEN	Manor Sporting Goods Co., 93-28½ Jamaica Avenue
WOODSIDE	Cye Hobbycraft Co., 39-84 61st Street

NEW YORK CITY

MANHATTAN	Billy Cooper, 11 Avenue A—Phone: GRamercy 7-1673 Crystal Electric Company, Inc., 1461 Third Avenue Hobby-Land, 25 Park Row Madison Hardware Company, 105 E. 23rd Street at 4th Avenue Phone: SPring 7-1111 Model Craft Hobbies Retail, Inc., 314 Fifth Avenue Model Railroad Equipment Corp., 23 West 45th St.—Phone: LU 2-2760-1-2 Neidoff's Radio & Electrical Appliances, 195 Columbus Avenue
BRONX	Electro-Craft Appliances, 9A West Tremont Ave.—Phone: LU 3-9410-11 Fazekas Bros., Inc., 1051 West Farms Road Honig's Cycle Service, 2725 White Plains Avenue Van Courtlandt Hobby Shop, 5973 Broadway
BROOKLYN	Belnord & Company, 474 Sterling Place Broadway Hobbycraft, 1638 Broadway Embassy Carriage Shop, 3181-85 Fulton St.—Phone: TAYlor 7-8643 Fix All Appliance Shop, 704 Kings Highway—Phone: ES 5-1894 Fred Frerichs Electric Co., Inc., 6316 Fifth Avenue Herman Electric, 1324 Flatbush Avenue

LIONEL APPROVED SERVICE STATIONS

NEW YORK CITY (Continued)

BROOKLYN

Hobby Train Mart, Inc., 37 Bond Street

STATEN ISLAND

RICHMOND

Sternor & LeBlanc, 245 Jewett Ave., Port Richmond, S. I.

NORTH CAROLINA

CHARLOTTE

Charlotte Hobby Center, 131 W. 4th Street
Model Railroad Supply Shop, 2941 Chelsea Drive

DURHAM COLDSPORO GREENSBORO RALEIGH

B. C. Woodall Company, 316 Holland Street
George A. Parker, 107 No. Center Street
Strong Tire Service, Inc., 401 North Elm Street
Johnson-Lambe Company, 118 S. Salisbury Street
Pets & Hobbies, Inc., 109 W. Martin St.—Phone: Raleigh 9772

OHIO

AKRON

Akron Electric Train Service, 1677 Marigold Avenue

BARBERTON BUCYRUS CANTON

Barberton Hardware Company, 579 Tuscarawas Avenue
Rogers Sporting Goods, 221 No. Sandusky Ave.—Phone: 5452
Dealer's Appliance Sales & Service, 4214 54th St., N.W.—Phone: 9-2100
The Eclipse Electric Company, 209 2nd St., N.E.—Phone: 59495

CINCINNATI

Don's Hobby Service, 824 Main Street
Foltzer's Electric City, 214 E. 4th St.—Phone: Main 5258
Ridge Hobby Shop, 6015 Montgomery Road—Phone RE 3085
X-L Model Shop, 2503 Fairview Ave.—Phone: CH 9810

CLEVELAND

Leonard M. Blum's Hobby House, Inc., 610 Huron Road
Cleveland Model & Supply Co., Lorain Ave. at W. 45th St.
Phone: Wo. 1-3600
Jaye & Jaye, Inc., formerly Cleveland Cycle & Model Company,
14679-81 Euclid Avenue—Phone: Ulster 1-1880
Reddig's Electric Train Service, 3553 Independence Road
Phone: Diamond 1-1447

COLUMBUS

Lester M. Riedel, 350 E. 248th St.—Phone: Redwood 1-0240
Salzer's Electric, Inc., 1760 E. 12th Street
Hobby Harbor, 121 E. Gay St.—Phone: Ma 5651
Hoffman Electric Train Service, Rear 485 Wilson Ave.—Phone: Ev. 83581

DAYTON FRIENDSHIP IRONTON

Dayton Model Railways, 1318 Wayne Ave.—Phone: Madison 4016
Bussa Model Railroads, Box 66
Paul's Hobby Shop, 306 So. 2nd Street

LIMA

Hobby House, 110 S. Elizabeth
The Murphy Electric Company, 304 So. Main St.
Penn Auto & Sporting Goods, 22-24 S. Main Street
The Happoldt Electric, 23 1st St., S.W.

MANSFIELD MASSILLON MIDDLETOWN NEWARK

Danny's Train Repair, 200 Shafer Street
Anderson's Service Store, 11 N. 4th Street

SPRINGFIELD STEUBENVILLE TOLEDO

Petry & Sons, R. R. 1
Hobby Haven, 155 So. 4th Street
Hines Hobby House, 621 Madison Avenue
Luelf Hardware, Inc., Galena at Ontario Streets
Tanber's, 1241 Dorr Street

YOUNGSTOWN

Model Hobby Shop, 2720 Cain Street
Carl W. Weimer, 520 West Evergreen Avenue

OKLAHOMA

ENID

Enid News & Stationery, 213 N. Independence

OKLAHOMA CITY

Nichols Hills Radio & Hobby Shop, 2340 Dorchester Drive
Woodmansee Abbott Music Company, 407 W. Main Street

TULSA

Brewster's, Peoria at Tenth—Phone: 2-3950
Oil Capitol Hobbyland, 702 S. Boston
Tulsa Hobby Center, 305 E. 4th Street

OREGON

EUGENE PORTLAND

Magazine Exchange, 125 E. 11th
R. Bowles-E. C. Flegel, 3804 N. Melrose Drive

LIONEL APPROVED SERVICE STATIONS

PENNSYLVANIA

ALLENTOWN
ALTOONA
ARDMORE
BETHLEHEM
CHAMBERSBURGH
CHESTER
COATESVILLE
DOYLESTOWN
EASTON

ERIE
GLENSIDE
HANOVER
HARRISBURG

HAZLETON
JOHNSTOWN

LANCASTER
LEBANON
LEWISTOWN
LLANERCH
McKEES ROCKS
McKEESPORT
NEW CASTLE
PENNSBURG
PHILADELPHIA

PITTSBURGH

POTTSVILLE
READING

SCRANTON

SHARON
UPPER DARBY
WAYNE
WEST PITTSSTON
WILKES-BARRE

WILKINSBURG
WILLIAMSPORT

YORK

Gene Bloch's Paint Store, 22 No. 8th St.
Central Electric Co., 1124 11th Avenue
D. F. Donohoe, 69 E. Lancaster Ave.—Phone: Ardmore 3316
Austin Electric Supply Company, 216 W. 3rd Street
Enos H. Horst Electric Store, 124 Lincoln Way West
Chester Light Supply Co., 801 Edgmont Avenue
Harry's Train & Model Shop, 104 N. 3rd Avenue
Hampton Radio & Appliances, 52 E. State Street
Hobby Hangout, 509 Northampton Street
Carl H. Messinger, 1529 Spring Garden Street
Erie Hobby Company, 406 State Street
Keswick Cycle Company, 408 N. Easton Road
E. J. J. Gobrecht, 120 E. Chestnut Street
Joe The Motorists' Friend, Inc., 3101 N. 7th Street
Russ Hobby Shop, 138 S. 17th Street
Jere Woodring & Co., 200 W. Broad Street
Johnston's Appliance Center, 135 Clinton Street
Reese & Bernard Electric Co., 132 Park Place
Felsing's Hobby Shop, R. D. No. 2
Keystone Appliance Company, 503 Cumberland Street
Grabbe's Electrical Service, 140 Valley Street
"Service of Merritt", 126 West Chester Pike—Phone: Sunset 9089
A. K. Electric & Hardware, 417 Chartiers Avenue
Johnston Appliance Store, 1013 5th Avenue
Kirk, Hutton & Co., 24 E. Washington Street
Hevener & Shelly, 400 Main Street
The Arnold Company, 1427 Vine Street
Baus & Sucro, 7205 Rising Sun Avenue
Wm. H. Becker, 46 No. 11th Street
Contino's Radio Electric, 2004 Snyder Avenue
D. & S. Hardware & Electronic Supply, 6624 Castor Avenue
D. & S. Hardware & Electronic Supply, 5936-38 Torresdale Avenue
The Electronic & Hobbycraft Stores, Inc., 324 W. Cheltenham Avenue
Hubbell Electric Company, 223 So. 11th Street
"Les" Myers, Inc., 21 So. 16th Street—Phone: RI 6-8047
Simkins Electric Co., 420 W. Susquehanna Ave.—Phone: GA 3-8207
Olney Miniature Train Parts & Repairs, 142 W. Linton Street
Schempp Bros. Hardware Co., 2526 Kensington Avenue
Simkins Electric Co., 420 W. Susquehanna Ave.—Phone: GA 3-8207
Nicholas Smith, 60 N. 11th Street
Tioga Electric Shop, S.E. Cor. 17th Street and Erie Avenue
Wolkin's, 48 So. 60th Street
Brentwood Electric Company, 2819 Brownsville Road
Conklin Radio & Electric Appliance Co., 1405 Lincoln Avenue
Phone: Hilland 1652
Ferry Electric Service Co., 127 4th Avenue
Larry's Hobby Shop, 1826½ Brownsville Road
Quick Service Electric Co., Jenkins Arcade, 509 Liberty Avenue
Phone: Atlantic 1-0968
Sheets Electric, 3 North Second Street
R. C. Geise, Jr., "Electric Train Sales & Service", 512 Jefferson Street, Hyde Park
Lapp Bros. Electrical Stores, 146 Washington Street
Fixit Shop, 610 Linden Street
Scranton Hobby Center, 315 Adams Avenue
Mihlbaugh's Service Center, 32 Silver St.—Phone: 5251
Herman's Repair Shop, 6833-35-37 Ludlow Street
Vecere's Hobby Shop, 101-103 E. Lancaster Ave.—Phone: Wayne 9726
Embleton's Electric Service, 422 Wyoming Avenue
Harry W. Hick, 27 Regent Street
Robbins & Uhl, 28 N. Main Street
Community Radio Electric Service, 745 Penn Ave.—Phone: Ch. 1-6464
Finks Sporting Goods, 17 West 3rd Street
Prior & Sallada Co., Inc., 230 Pine Street
The Model Craft Shop, 115 So. George Street

LIONEL APPROVED SERVICE STATIONS

RHODE ISLAND

PAWTUCKET
PROVIDENCE

Farrell & Goff, 166 Pawtucket Avenue
G. & B. Supply Company, 435 So. Main Street
The Hobby Shop, 73 Empire St.—Phone: Jackson 1-1712
The Train Shop, 112 Broad St.—Phone: Jackson 1-9099

SOUTH CAROLINA

CHARLESTON
COLUMBIA
FLORENCE
GREENVILLE
HARTSVILLE
SPARTANBURG

The Carolina Hobby Shop, 221 King Street
Electric Supply Co., 161 Meeting Street
Westons, Inc., 3308 Millwood Avenue
Florence Models & Toys, 390 West Evans St.—Phone: 3143
DeLany's Sporting Goods, 24 College Street
J. L. Coker and Company, 1255 Carolina Avenue
Aaron C. Read, 570 Reidsville Road

TENNESSEE

BRISTOL
CHATTANOOGA
KNOXVILLE
MEMPHIS
NASHVILLE

Larry's Railroad Toyland, 17 6th Street
Harden Repair Shop, 2806 8th Avenue
The Hobby Shop, 511 W. Clinch Avenue
Electric Train Hobby Shop, 841 Barbara Drive
Hobby Center, Inc., 368 N. Cleveland
Austin Electric Shop, 3430 West End Avenue
Burk & Company, 416-22 Church Street

TEXAS

ABILENE
AMARILLO
AUSTIN
BEAUMONT
CORPUS CHRISTI
DALLAS
EL PASO
FORT WORTH
HOUSTON
McALLEN
SAN ANTONIO
TYLER

D. & W. Tire Company, 102 Elm Street
Southern Equipment & Supply Co., 411 Fillmore Street
George Stautz, 116 W. 5th Street
Stuart's, Inc., 301 Orleans Street
C. C. Toy & Model Shop, 929 South Staples Street
Hall's Hobby House, 4823 Bryan at Fitzhugh
Hobby Nobby Stores, 1625 Pacific Ave.—Phone: Riverside 0442
Lowenberg Hobby Shop, 2511 E. Yandell Blvd.—Phone: 2-5397
Modelcraft, 1304 W. Terrell
G. & G. Model Shop, 1523 Isabella Street
C. R. Stone Electric Co., 2003 Pease Avenue
Valley Model Supply Co., 116A South Broadway
Dibble's, 313-315 S. Alamo Street at Goladi
The Fixit Shop, 801 Fredericksburg Road
Flinn-Holley, Inc., North Broadway at Locust

UTAH

OGDEN
SALT LAKE CITY

P. G. Boam Company, Rear 2326 Washington Blvd., P. O. Box 1401
Electronic Service & Supply Co., 115 East Broadway
Zion's Cooperative Mercantile Inst., Dept. 110, 15-39 So. Main Street

VERMONT

BENNINGTON

Western Auto Associate Store, 126-128 North Street

VIRGINIA

ALEXANDRIA
BRISTOL
CHARLOTTESVILLE
LYNCHBURG
NEWPORT NEWS
NORFOLK
RICHMOND
ROANOKE
STAUNTON

Fagelson Hardware & Toyland, 1311-15 King Street
Phones: OV 4040—AL 9494
A. L. Ladd, 1013 King Street
Larry's Railroad Toyland, 17 6th Street
Piedmont Refrigeration Co., 220 W. Market Street
Basham Model Service, 213 9th Street
The China Palace & Gift Shop, 3307-09 Washington Avenue
The Hobby Center, 3704 Washington Avenue
G. Engel & Son, 721 Granby Street
Toy Craft, 3904 Granby Street
Jones & Gooding, 3158 W. Cary Street
Wamaco Products, 500 Perdue Avenue
Coon Electric Co., Inc., 3520 Williamson Road, N.W.
Jennings-Shepherd Co., 411 1st Street, S.W.
Ast Hardware Co., Inc., 102 W. Beverley Street

LIONEL APPROVED SERVICE STATIONS

WASHINGTON

**RICHLAND
SEATTLE**

Johnson & Reutlinger, 800 Geo. Washington Way
Model Engineering, 12240 Linden Avenue
Model Railroad Repair Service, 7001 29th N.E.
Spokane Cycle & Toy Co., 217-219 No. Post Street
Herzog Electric & T.V., 6305 Steilacoom Blvd. S.W.
Staves & Son, 802 S. Naches Ave.—Phone: 29027

**SPOKANE
TACOMA
YAKIMA**

WEST VIRGINIA

**CHARLESTON
CLARKSBURG
ELKINS
HUNTINGTON
PARKERSBURG
WHEELING**

Model Railroad Service Shop, 603 Main St.—Phone: 2-3381
Snyder's 324 Traders Avenue
Mack Nestor & Co., 203 Davis Avenue
Phillip's Model Railroads, 1317 Charleston Avenue
Wilson Hobby Shop, 1309 Seventh Street
Dunn's 1329 Market Street

WISCONSIN

**APPLETON
FOND DU LAC
GREEN BAY
LA CROSSE
MADISON
MILWAUKEE**

Schiedermayer's, 623-625 W. College Avenue
Albert Hauer & Sons, Inc., 173 S. Main Street
South Side Radio Service, 702 West Mason Street
George Tire & Battery Service, 218-220 S. Third Street
Leon Cobb Repair Service, 1843 Monroe Street
"Brownie, The Train Man", Brown Electric Supply Co.,
3889 No. Port Washington Avenue
Garfield Cycle & Sport Shop, 2971 N. 3rd Street
Milwaukee Model Shop, 3308 W. Lisbon Avenue
Northern Supply Company, 2229 W. Fond du Lac Avenue
Phone: West 3-8902
The Hobby House, 51 Main Street
Dery's Hobbyland, 917 Pinos Street
Nelson's Sport & Golf Shop, 6320 W. Greenfield Ave.—Phone: SP 4-6321

**OSHKOSH
RHINELANDER
WEST ALLIS**

WYOMING

CHEYENNE

Barrett's Roundhouse, 1009 Converse

CANADA

ALBERTA

**CALGARY
EDMONTON**

Universal Hobby Supplies, 623A 8th Ave. West
Couves Radio, 10116 103rd Street
Couves Radio, 10210 106th Street
Specialty Repairs, 106 Bradburn-Thomson Block

BRITISH COLUMBIA

VANCOUVER

The Electric Train Repair Shop, 8131 Cartier Street
Vancouver Model Supply, 2193 W. Broadway
Woodward Stores, Ltd.

VICTORIA

Silsby's Electric Train Service, 1325 Balmoral Road

MANITOBA

WINNIPEG

Hamilton Laboratories, 206 Donald Block-Donald Street
Sheane & Son, 74 Chestnut Street

NOVA SCOTIA

HALIFAX

Popular Specialties, Reg'd, 255 Agricola Street

ONTARIO

**BRANTFORD
HAMILTON
LONDON
OTTAWA**

The Hobby Shop, 7 King Street
Riley Hobby Service, 755 King Street East
Davis Radio & Electric Service, 827 Dufferin Avenue
Earl Gray, 251 Flora Street
Murphy-Gamble, Ltd., 118 Sparks Street
Aikenhead Hardware, Ltd., 17-21 Temperance Street
The T. Eaton Company, Ltd.
Greenwood Hobby Shop, 222 Greenwood Avenue
W. J. Rodman Elec. Train Maintenance & Repair Co., 60 36th Street
St. Clair Hobby Shop, 625 St. Clair Avenue W.
The Robert Simpson Company, Ltd.

TORONTO

WOODSTOCK

Woodstock Electric Co., 122 Dover Street

LIONEL APPROVED SERVICE STATIONS

QUEBEC

MONTREAL

Charley's Train Shop, 2107 Rachel East
Electric Appliances, Ltd., 622 Craig Street West
Electrodesign, 145 Normand Street
Richard M. Ferguson, 2303 Oxford Avenue
Mitchell's Electrical Appliances, 5018 Sherbrooke West
Therac Company, Ltd., 2014 Metcalfe Street
The Trainatorium, 1518 Sherbrooke Street West
Arthur Richard & Son, 696 2nd Avenue

QUEBEC

FOREIGN SERVICE STATIONS

ARGENTINA

BUENOS AIRES

Ezio Guggiari Soc. de Resp. Ltd., San Martin 1145

AUSTRALIA

CAMPERDOWN, SYDNEY

Amplion (Australasia) Pty. Ltd., 36-40 Parramatta Road

BELGIUM

BRUSSELS

De Smedt & Kugener, Place des Martyrs 3

BRAZIL

SAO PAULO

Companhia Comercial Estrela, 266 Rua Joaquin Carlos
Gagliasso Importadora S. A., Al. Barao de Limeira, 387

COLOMBIA

BOGOTA MEDELLIN CALI

Distribuidora Philco S. A., Gerencia Carrera 9A 14-36
J. y A. Vasquez L., Carrera 49 No. 52-29
Martinez Docampo and Cia. Ltda., Carrera 8A Nos. 11-02 AL 11-14

CUBA

HAVANA

Cortina y Cia., Aguilar 609

ENGLAND

LONDON

S. Guiterman and Co., Ltd., 37, Soho Square

GUATEMALA

GUATEMALA CITY

Biener y Cia. S.C., Apartado de Correos 256

HAWAII

HONOLULU

The Hawaiian Elec. Co. Ltd., 900 Richard Street

INDIA

BOMBAY NEW DELHI MADRAS CALCUTTA

General Radio and Appliances Ltd., 16, New Queen's Road
General Radio and Appliances Ltd., 72, Queensway
General Radio and Appliances Ltd., 1-18 Mount Road
General Radio and Appliances Ltd., 10, Old Court House Street

IRAN

TEHERAN

Grigori Mirzaturun, 302, Tcharah Mokhber-El Dowleh

MEXICO

MEXICO CITY, D. F.

H. Steele y Cia., S. A., Av. Jaurez y Balderas 27

NICARAGUA

MANAGUA

J. C. Martinez and F. A. Mendieta Cia., Ltd., Apartado No. 74

NEW ZEALAND

WELLINGTON

E. J. Hyams and Son, Ltd., 118-120 Wakefield Street

PAKISTAN

KARACHI LAHORE

Electronic & Film Equip. Ltd., Gulshan-e-Nasrat, Victoria Road, Saddar
Electronic & Film Equip. Ltd., The Mall

PHILIPPINE ISLANDS

MANILA

Philippine Education Co., 1104 Calle Castillejos

SOUTHERN RHODESIA

BULAWAYO

Harrison and Hughson Ltd., P. O. Box 854

SWITZERLAND

ZURICH

André Dewald and Fils S. A., Seestrasse 561

UNION OF SOUTH AFRICA

JOHANNESBURG CAPE TOWN DURBAN PORT ELIZABETH

Modern Appliances, Ltd., 14 New Street South
Modern Appliances, Ltd., 117-119 Bree Street
Motor and General Sup., Ltd., 138-142 West Street
Modern Appliances, Ltd., 80 Main Street

VENEZUELA

CARACAS

Oscar T. de Sola, Apartado 545

LAMP REPLACEMENT CHART

Cat. No.	Item	Volts	Color	Lamp No.	Price
022	Switch	18	Clear	2028-58	\$.30
022C	Controller	18	Red	28-6	.30
022C	Controller	18	Green	408-45	.30
26	Bumper	14	Clear	151-51	.30
042	Switch	18	Clear	2028-58	.30
58	Lamp Post	14	Frosted	39-3	.30
70	Floodlight	14	Clear	151-51	.30
71	Lamp Post	14	Clear	151-51	.30
132	Station	14	Clear	315-20	.30
145	Gateman	14	Clear	151-51	.30
151	Semaphore	14	Clear	151-51	.30
153	Block Signal	14	Red	153-50	.30
153	Block Signal	14	Green	153-48	.30
154	Highway Signal	14	Red	153-50	.30
164	Log Loader	14	Clear	27-3	.25
252	Crossing Gate	14	Clear	151-51	.30
256	Freight Shed	14	Clear	151-51	.30
364	Lumber Loader	14	Clear	151-51	.30
394	Rotary Beacon	14	Clear	394-10	.40
395	Floodlight Tower	6-8	Clear	Q-90	.25
455	Pumping Station	14	Clear	151-51	.30
456	Coaling Trestle	14	Clear	151-51	.30
622	Diesel Switcher	14	Clear	151-51	.30

Cat. No.	Item	Volts	Color	Lamp No.	Price
681	Locomotive	18	Clear	752-9	.30
736	Locomotive	18	Clear	752-9	.30
773	Locomotive	18	Clear	752-9	.30
1121	Switch	14	Clear	315-20	.25
1121C	Switch Controller	14	Clear	315-20	.25
2023	Diesel Locomotive	14	Clear	151-51	.30
2035	Locomotive	18	Clear	752-9	.30
2036	Locomotive	18	Clear	2026-58	.30
2046	Locomotive	18	Clear	752-9	.30
2330	Electric Locomotive	18	Clear	2026-58	.30
2343	Diesel Locomotive	18	Clear	2026-58	.30
2344	Diesel Locomotive	18	Clear	2026-58	.30
2421,2-3	Pullman Cars	6-8	Clear	Q-90	.25
2525-7-8	Pullman Cars	18	Clear	717-54	.30
4357	Electronic Caboose	14	Clear	315-20	.25
4681	Electronic Locomotive	18	Clear	752-9	.30
6357	Caboose	14	Clear	315-20	.25
6420	Wrecker-Caboose	14	Clear	2420-20	.50
6457	Caboose	14	Clear	315-20	.25
6520	Searchlight Car	14	Clear	151-51	.30
LTC	All Transformers	6-8	Clear	Q-90	.25
	Lockon	14	Clear	2026-58	.30

* In these installations the lamps are placed in "series".

This chart lists all illuminated equipment produced in 1950. For replacement lamps used in earlier equipment consult your Approved Service Man or the Factory Service Department.

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